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MANUAL FOR THE STUDY OF FOOD HABITS

REPORT OF THE COMMITTEE ON FOOD HABITS

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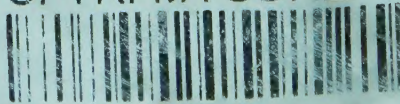
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FOREWORD

Great headway has been made in recent years in building up scientific understanding of the food nutrients the body needs. In the collateral field of the study of food habits and of getting people to conform to scientific knowledge, only pioneering work has been done. Contributions are especially needed in: 1) the accumulation of sound basic data about food habits; and 2) the development of flexible methods suitable to solving emerging problems in this field.

Since November 1941, the Committee on Food Habits of the National Research Council has been gathering, coordinating, and appraising the available but scattered data in the field of food habits. At the same time it has encouraged additional and new approaches to research in this field. Utilizing the cultural approach, the Committee has investigated the factors which have brought about changes in food habits and the methods and procedures which have proved most effective in bringing dietary habits into conformity with dietary needs. Through its experience, certain definite principles have been arrived at. These can now profitably be offered to students of human behavior.

I feel that the Committee has made a very important contribution to scientific method in publishing this "Manual for the Study of Food Habits." I believe it is most timely and that it will be extremely valuable as a guide in extending research in food habits and in developing and broadening the interest in this subject.

M. L. WILSON, Chief
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Office of Marketing Services
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PREFACE

This manual has been prepared as a contribution by the Committee on Food Habits of the National Research Council to the development of the field of food habits research. The main outlines of the problem and some account of the pilot studies were published in 1943 as *The Problem of Changing Food Habits* (National Research Council—Bulletin 108).

This present bulletin is directed toward a number of different types of students: those who wish to become specialists in the study of foodways of contemporary societies; those who wish to explore ways in which the science of nutrition can become an integral part of the food patterns of our society; those whose disciplinary responsibilities include a need for knowledge of and research in food habits, such as specialists in family life, nursery school education, standards of public welfare, practitioners in the field of mental hygiene and psychosomatic medicine, etc.; those responsible for large-scale social surveys in which the food habits of the populations studied will be one item covered; and scientists who wish to conduct their researches, primarily designed to further knowledge in their own chosen discipline, in some field where their results will at the same time be immediately useful to mankind. Exigencies of financing research, as well as a quickened social conscience, suggest that in a period of such rapid social change as the present, whenever pure research can be conducted in fields of immediate usefulness, the place of the research worker in society will become more significant.

Nutrition is a field in which enough scientific knowledge has been accumulated so that the well-being of mankind can be enormously enhanced by its application. The goal of better nutrition for the peoples of the world is one upon which nations and groups which differ in many other ways can agree and toward which they can work. The effort to reach this goal can be implemented only by bringing to bear all of our scientific knowledge, that of human cultures as well as of the human body, that of human attitudes toward food as well as of the chemistry of the food itself.

The plan of this manual was developed by the Committee on Food Habits and it has been executed under Committee direction by the staff. Dr. Margaret Mead, the Executive Secretary, is responsible for Sections I, II, III, and IV, and Dr. Patricia Woodward, Associate Executive Secretary, for Sections V and VI; the editorial work has been done by Miss Rose Kerrett, assisted by Miss Jessie Poesch.

CARL E. GUTHE, *Chairman*
Committee on Food Habits
National Research Council

	PAGE
4. Induction of the New Generation into the Food Pattern.....	42
a. Developmental approach	42
b. Infants' early experience with food.....	42
c. Elimination patterns affect food attitudes.....	43
d. Parental attitudes	43
5. Material Culture and Technology of Food.....	43
a. Utensils and tools.....	43
b. Type of building and room facilities used in food processing..	44
c. Realistic adaptation of methods to available cooking facilities.	44
d. Material culture data necessary for comparison with other cultures	44
6. Food Pathology	44
a. Factors influencing development of cults and food fads.....	44
b. Cults and fads as modifying popular acceptance of nutrition concepts	45
c. Psychosomatic manifestations and food habits.....	45
7. The Study of Stability and Change.....	45
a. Direction of change.....	45
b. The study of stability.....	46
B. PLACING A PROBLEM WITHIN THE CULTURAL CONTEXT.....	47
1. Intensive Studies	48
2. The Development of Flexible Methods.....	52

PART IV

SOME TECHNIQUES WHICH HAVE BEEN USED IN OBSERVATIONAL STUDIES OF FOOD HABITS

PART V

EXPERIMENTAL METHODS IN THE FIELD OF FOOD HABITS

A. UNDER WHAT CONDITIONS CAN A DIET BE SELECTED WHICH WILL MEET PHYSIOLOGICAL NEEDS ADEQUATELY?.....	61
B. UNDER WHAT CONDITIONS CAN ANIMALS SELECT THE MORE NUTRITIONAL FOOD MIXTURE FROM TWO OR MORE POSSIBLE CHOICES?	65
C. WHAT EFFECT DOES PREVIOUS EXPERIENCE HAVE ON THE SELEC- TION OF FOOD?.....	66
D. DO ANIMALS EXHIBIT PREFERENCES, AND, IF SO, WHAT ROLE DO THEY PLAY IN THE SELECTION OF FOOD?.....	69
E. UNDER WHAT CIRCUMSTANCES CAN PREFERENCES BE CHANGED?..	70
F. WHAT EFFECT DOES DEPRIVATION HAVE ON FEEDING BEHAVIOR?..	72

	PAGE
G. IN WHAT WAY DO SOCIAL AND EMOTIONAL CONDITIONS INFLUENCE BEHAVIOR TOWARD FOOD?.....	76
H. WHAT TYPE OF BEHAVIOR HAS BEEN USED TO STUDY INTENSITY OF HUNGER?	80
I. WHAT TECHNIQUES HAVE BEEN DEVELOPED TO STUDY THE FOOD AND TASTE PREFERENCES OF HUMAN BEINGS?.....	83
J. WHAT TECHNIQUES HAVE BEEN USED TO CHANGE FOOD CHOICES OF HUMAN BEINGS?.....	84
K. WHAT EFFECT DOES NUTRITIONAL STATUS HAVE ON LEARNING ABILITY AND PERFORMANCE?.....	90

PART VI

HOW TO FIND REFERENCES IN THE FIELD OF FOOD HABITS

PART VII

BIBLIOGRAPHY

A. ORIENTATION BIBLIOGRAPHY	101
B. BIBLIOGRAPHY	103
C. PARTIAL INDEX TO ALPHABETICAL BIBLIOGRAPHIES.....	132
1. Some Regional Studies.....	132
2. Studies Within the United States.....	133
3. Theoretical Articles	134
4. Psychosomatic Studies	134
5. Studies of Children.....	134
6. Methods	134
7. Bibliographies	135
INDEX	137

PART I



INTRODUCTION

I. INTRODUCTION

The study of food habits is an applied science to which many different sciences have to contribute in order to find answers to the questions that come up continually in our attempts to improve the nutrition and living habits of the peoples of the world. As in any field of applied science, the solution of one problem only paves the way for another problem.

The varying conditions we have to deal with are, among others: 1) the traditional habits of a people in regard to what they eat and what they do not eat and how each generation of children learns to follow these traditional eating habits; 2) the existing states of food production, food processing, food distribution, including the extent to which any given food is available and accessible to each group in the population; 3) the existing state of the science of nutrition; 4) existing media for diffusing knowledge about nutrition; 5) existing medical practices which influence food habits; 6) existing conditions of and current changes in related environmental contexts such as housing, household equipment, transportation, etc.; 7) existing states and current trends in child training and education, including educational, preventive, and therapeutic measures, etc. Since all of these conditions are changing, some rapidly, some slowly, the interrelationships between them are also continuously changing.

As we are successful in educating people to include the findings of the science of nutrition in the way in which they plan meals and choose foods, this knowledge will alter their attitude toward eating, which will in turn create new conditions that will have to be studied and understood. As the problems change, new methods will have to be developed.

But although the problems will always be new and there will never be any solution which is final, even for a few years, two developments of permanent value can be expected to which research workers, students working on group projects, individuals working for degrees, and participants in larger group researches on different aspects of the contemporary scene can contribute: 1) the accumulation of a sound, consistently collected body of data about food habits; 2) the development of flexible methods suitable for solving emerging problems in this field.

The study of food habits may be defined as the study of the way in which individuals or groups of individuals, in response to social and cultural pressures, select, consume, and utilize portions of the available food supply. In common parlance, when we say an individual has "good food habits" we mean that he habitually consumes food in conformity with the standards of eating to which we subscribe. Such a statement may refer to the pattern of selection, to the range of selection, to a failure to reject any food, to the regularity and consistency with which certain foods are eaten, etc. "Bad food habits" may be applied to a failure to conform to certain standards of the same sort. At any given period in history, the standards which are

invoked in the phrases "good" or "bad" will be a mixture of traditional usage, current nutritional knowledge, holdovers from past nutritional knowledge, and differences between one school of nutritional thought and another. Individuals may be approved or condemned for drinking a quart of milk a day, for eating more or less than the traditional number of meals, etc.

These compounds of tradition, morality, and science are terms also often applied to other peoples. The nutritionist reporting on the state of health of another country than his own may comment, "When I saw the way those people lived I realized how important food habits are." When he makes such a comment, he may still be thinking in terms of a large number of individuals who, because of lack of education, prefer to eat the "wrong foods." He may have made the further abstraction that a whole society may have a set of food habits which are traditional—sometimes called foodways—and shared by all members of that society, including not only the preference for certain foods, but a whole interrelated system of food production, preservation, distribution, and consumption.

He will then realize that changing the food habits of 3,000,000 people is not simply a question of "education" in the sense of introducing new standards through the schools, but that food habits are interwoven with the entire way of life of the people, and that points of leverage for change may be found in the schools, at state dinner parties, in the advertising pages of magazines, or in the methods of packaging processed foods. Conversely, he will realize that resistance to change may come unexpectedly from any part of the social system and defeat well-planned attempts at change.

A number of sciences, economics, sociology, anthropology, psychology, physiology, food biochemistry, soil chemistry, genetics, etc., contribute to our understanding of the way in which human beings, as organisms living within a social system, in a given physical environment, are nourished so that they survive at various levels of efficiency and reproduce themselves.

In the field of food habits we may focus upon the physical environment in terms of soil and water, the type of food grown there, and under what circumstances it will be possible to give adequate nourishment to a population within a given environmental range. We may study the existing diet through changes in that diet brought about by the use of fertilizer, by selective feeding of animals, or by genetic alteration of hereditary strains of plants and/or animals.¹⁹⁸ Under such an approach, the food habits of a given group of people in a given region are taken as the relatively inflexible factor, and efforts are made, in terms of the local economy, to modify the food so that the people, while preserving the same food habits, will be better nourished. The whole movement toward the enrichment, restoration, or reinforcement of common foods on a national or world-wide scale is of the same order. It treats the food habits of a population as inflexible, yet alters the composition of the foods which they habitually eat.

Or we may study a people's food habits in terms of their receptivity to new or unutilized foods which would supplement an insufficient diet.⁴⁷⁶ Under this approach, which contemplates the alteration of the existing food

pattern, it is necessary to study the existing food habits of a people and to devise ways of modifying them to include the foods necessary to supplement the diet.

Great Britain during World War II followed a combination of these two methods. Whenever possible, the habitual food pattern was preserved and supplements were added to the bread, or to the food when prepared in mass feeding operations. Only where it was necessary to increase the consumption of a food like carrots was great effort made to alter the behavior of the people rather than the constituents of the food. In the United States, with greater food margins and less food control, effort has been directed toward educating the people to make individual adjustments to changing food conditions. This emphasis on individual adjustment was congruent with the type of nutrition education approach which discovers what people's food habits are, brands some of them as wrong, and attempts to introduce new food habits by various means—moral suasion, threats, bribes, and social pressure; first at the conscious level, in the hope that after an individual has chosen, consciously and with a great moral effort, the right food for a certain length of time, he will then choose it automatically.

There has been a steady drift toward making such food choices easier, from the schools of thought which emphasized thinking in precise mathematical terms to the basic food chart introduced in the national nutrition movement in 1941, which gave a pattern within which wide individual latitude was possible.

The lack of reconciliation between the approaches to nutrition which emphasize altering the food and those which emphasize altering the habits of individual consumers has been in part due to the absence of a consistent body of data in regard to food habits, to the way in which children learn to eat or reject traditional foods, the way in which foods are categorized in any given society, the whole complicated set of beliefs and practices that regulate the way in which each human being, born with the needs common to all mammals, becomes a socialized individual, accepting and rejecting parts of his environment as edible and non-edible, at different times, for different purposes, in different situations.

The educators have not differentiated food habits from any other type of habit. If children could be taught to write by the Palmer method rather than in Spencerian style, then they could be taught to eat foods which contained vitamins instead of foods that did not. The food biochemists and the plant geneticists have taken the opposite course. Food was a material which their sciences taught them how to modify, while the motives and preferences of the human race remained inscrutable and arbitrary. So the biochemist wishes to use a knowledge of chemistry to alter not the habits, but the results of the habits, of human beings. A different twist is given to the whole question by the physiologist, who claims that if we could only have a human organism undistorted by educational pressures, it would be able to choose the correct nutrients—in a society where other human organisms, modified by the most advanced scientific knowledge, prepared the nutrients for them in pure

form.⁵³⁵ Meanwhile all three schools of thought are thrown back to the basic economic problem of the presence or absence of either the food itself or the purchasing power to obtain it. Those who focus on the economic problem point to the fact that people of a class or nation with the most food available are the best fed from a nutritional standpoint, and insist that it is not a matter of food habits, or even of composition of particular foods, certainly not one of attempting to train human organisms to make idiosyncratic physiological choices, but simply a matter of producing enough foods.

The field of food habits is the meeting ground of all these approaches. If the approach of the food biochemist is accepted, then a study of existing food habits is needed to indicate just which foods may be most profitably enriched and what steps must be taken to ensure that the enrichment does not misfire and build up attitudes of rejection (like that toward war bread), etc. If the approach of the agronomist and the geneticist is to be followed and existing elements in the diet are to be improved in this way, then such an approach includes an attempt to stabilize the food habits of the population whose food is being improved. If a careful study of the diet of a region showed that tomatoes were a highly favored food and might reasonably carry more of the load of providing certain vitamins than they do today, it would also be necessary to study the foodways of that population, and to take steps to prevent the diet's altering in some way so that after being improved, the consumption of tomatoes would not decrease in proportional importance.

The experiments of the physiologist in self-selection have to be integrated with existing habits of eating, the meal pattern, the way in which children are served or are permitted to serve themselves, cafeterias and à-la-carte service as contrasted to the home or restaurant meal that has been nutritionally balanced. If, through the efforts and the investigations of the economist, we know that the purchasing power of a given population or section of a population is to be very much increased, only a knowledge of their present food habits and the likely direction of alteration will make it possible to direct that increased purchasing power to maximum nutritional use. On the other hand, if there is to be a shortage of food or a shrinkage of purchasing power, a knowledge of the people's food habits is essential to make the necessary adjustments to preserve health and strength.

Knowledge of the foodways of a society, that is, of the food habits of the members of that society, is a meeting ground for all these attempts to apply modern science to the subject of human nutrition. Furthermore, it will continue to be so. There is no reason to believe that scientific nutrition will cease to be an ongoing process, changing with our increased scientific knowledge, with alterations in the form of society, in the methods of rearing children, in the incidence of disease and the emergence of new diseases, with new discoveries such as insulin, with changes in the hygiene of pregnancy and lactation, of growth, and of old age. Each new condition introduced by changing political organization, new scientific developments, new movements of peoples, or changes in the natural environment (soil erosion, new pests, changes in climate) will call for adjustments in the food habits of populations.

Appeals to motivations appropriate at one time and place will prove empty and dead at another time and place. A type of food habits which has meant a high order of adaptability in one sort of situation, e.g., eating what is set before you in the Army when the feeding has been planned by dietitians, may prove highly maladaptive in others, e.g., eating what is set before you in a boarding house run for profit in a period when all the protective foods can be obtained only at a high price. In a society which changes as rapidly as ours we will need continual new inventions in ways of educating a population to a degree of adaptability permitting mobility, conformity when conformity is desirable, and selectivity when selectivity is necessary. Continuous, ongoing research in the field of food habits is a necessity if we are to reap full social benefits from the findings of biochemistry and physiology, agronomy, and economics.

Furthermore, there is need for continued research in the field which takes into account existing purchasing power, existing nutritional knowledge, the existing food habits of the population. We also need historical perspective, because each generation of children is reared and influenced by the two preceding generations. Food habits are reflected not only inside the home.²⁰⁴ They are reflected also in the attitudes of statesmen, politicians, publicists, educators, whom the scientists have to convince of the desirability of some new advance. An adequate study of food habits, year by year, decade by decade, will provide the background for the necessary alteration in our public procedures which influence food consumption as well as in the actual eating habits of the population. Whether food is regarded by public officials as something to sell or something to eat; whether the need for food of every human being is regarded as a natural and inalienable right or a legally restricted right dependent upon whether he "earns his living"; whether eating food is regarded as a duty to society, which is denied in a hunger strike, giving society a right to feed the hunger striker forcibly—all of these attitudes, which stem from the whole cultural attitude toward food, condition the acceptance of any scientific improvement in nutrition.

Food habits are studied so that we may know how well the practice of individuals, as patterned by their culture, or the type of individual experience permitted by the culture, assures adequate nutrition. Certain other considerations enter, such as the advisability of increase of stature of a whole population, or the level of fatigability at which it is desirable to maintain the part of a population doing heavy work. At one stage in our developing ethics of human welfare, it may be enough if the existing food habits preserve the population in the state of well-being in which they are found and have enough flexibility to permit them to meet inevitable change, such as that introduced by new food processing methods or imports of new foods. At a different stage of ethical sensitivity we may demand that the food habits of a population provide a basis for altering their food intake to supply not usual or present state of well-being, but an optimum state of health. We need not expect that the definition of optimum health will remain static, and so we may then require a higher degree of flexibility in food habits or, expressed another way,

flexibility in institutional practices—such as number of meals, content of meals, methods of food preparation, etc.—to meet our new standards of what constitutes a good society. An applied science inevitably involves such changing values, and this should be explicitly recognized in the construction of research.⁴⁴⁰

We now come to the problem of how every study, however limited its scope or immediate its research aim, can also contribute to our growing knowledge of the food habits of the peoples of the world. Historically, there has been a great distinction between students of primitive and vanishing societies and students who worked within our own society. The first group, ethnologists and social historians recording vanishing social systems, were committed to making a large, rather regular set of observations, whatever the particular problem on which they worked. The assumption was: "You are the only person who will study these people at this period in their history. Later when another observer comes, the people will be changed. Perhaps no other observer will ever come. Therefore there is a body of relevant data which it is your obligation as a scientist to record regardless of the particular problem which you yourself wish to investigate."

So the student who was primarily interested in social organization was expected nevertheless to come back with a usable description of houses and canoes; the student of technology was expected to come back with a formal description of the kinship terms or the religious ritual. This obligation, which originally developed on the theory that there would be no other observer, later became embodied in anthropological theory, in the practice of placing any comment upon a society in the context of the whole tradition. So other anthropologists incorporated in their pattern of thinking an insistence upon completeness of data which had originally developed as a responsibility to history.

But when psychologists or sociologists have made studies within the framework of our familiar civilization they have been held to no such responsibility for making the data they used concrete enough to be relevant to the future researches of other scientists. They have been taught that they must take account of other studies which have used the same or related *methods* and of other studies which have sought to solve related *problems*, but that the actual data used in those other studies were irrelevant. Consequently a series of psychologists might study relationships between I. Q. and socio-economic class or I. Q. and race without being held responsible for systematically recording in each case the data which formed the background for their particular experiments. Social historians were judged by their fidelity to good past patterns rather than by their obligation to accumulate the same sort of data. Sociologists were expected to take cognizance of other work done in the same area, but were not required themselves to add data of the same order.

These tendencies were natural enough for several reasons. In the first place, the classical psychologist sometimes assumed that he was dealing with something called "human nature," and that the accidents of language, religious belief, class position, postural and gesture systems associated with any civilization might be ignored or at the most held constant. It is only very

recently that it has been generally realized that, unless a psychological experiment is evaluated in terms of the culture within which it is planned and carried out, we miss many of its implications. Also, there was no sense of urgency or possible loss in the study which was made, such as of school children's attitudes toward different types of suggestion. No one thought it necessary to describe the schoolroom, how a fourth-grade teacher dressed, what was the usual ritual of recess or homework. These were familiar circumstances of everyday life which everyone *knew*; they were not on a par with the bull roarer or the wigwam of the savage which had to be meticulously described if they were to be understood at all. So we have masses of studies which have utilized current cultural data without recording it, without recognizing an obligation to observe it systematically.^{42, 43}

This is a loss in two senses. The systematic observation of the factual data involved, for example, in a study of resistance to change, or amenability to suggestion, brings into focus the cultural setting within which the experiments are being made. A great number of facets of the problem and a great many new relationships emerge which would otherwise be missed. Secondly, we have no systematic mass of observation on such subjects as educational practices, food habits, health observances of different periods, regions, and classes, against which we can make systematic comparative observations in both time and space. When we come to any crisis in applying our scientific knowledge we have no mass of data upon which to fall back. Therefore it seems to be a definite responsibility of workers in fields like food habits, while they are exploring new problems and new methods, to build up a systematic mass of material which has been collected with impartiality and a fair degree of uniformity.



PART II



THE APPROACH OF THIS MANUAL

II. THE APPROACH OF THIS MANUAL

It is proposed in this manual to set up preliminary standards for the collection of basic data on food habits which any study, whether pursued from the standpoint of psychology, psychiatry, sociology, anthropology, or home economics, should be responsible for recording or systematically taking into account. Such a pattern as this can be added to as new classes of data emerge with the development of new hypotheses. By this process of addition to a consistent core one study can be related to another and no study is wasted. Furthermore, partially trained students and persons who are not primarily committed to research in human behavior can nevertheless make contributions of real importance in the collection of basic data.

To draw the conclusions which are needed today, to shape an educational program, to estimate the impact of some food shortage, some new food, some change in processing or distribution, to adapt a new medical discovery in the field of allergies, to expand the insights of mental hygiene into the feeding of the young child, or to estimate the importance of food and drink in a program of institutional care—for these and numberless other decisions which are now taken partly in the dark, we need data. We need data on the food habits of the American people, by class and age and sex, by region, by foreign nationality background, by degree of urban or rural residence, by occupation, by religion, by disease groups, by date of birth (for the food habits of people who are sixty today will differ from the food habits of those who become sixty in 1965), by amount of education, etc. There are several ways of getting such data. A giant survey could be conducted, costing many hundreds of thousands of dollars, the results of which, while systematic, would be out of date in a few years unless they were again built upon by later surveys. Or we can set up a pattern of research which includes as a matter of course the collection of these data, to the end that as our research grows, as our problems widen and our ability to solve them increases, so will the data which we need increase.

It is from the second point of view that this outline is presented. The student must judge how wide to throw his net. One method of narrowing the scope of data which he or she will attempt to collect will be to give cursory, main-heading attention to some subjects and detailed attention to others. The student of changes in food patterns which result from changes in equipment will need to describe the usual battery of pots and pans in great detail, but no student of other aspects of food habit problems should be absolved from describing the major utensils with which food is prepared among the people whose food habits he is studying. The student who is attempting to develop a method for evaluating the degree of overestimation or underestimation involved in a recall questionnaire on food eaten must know which foods are valued and which are undervalued, and how they fit into the total available list of foods. The student of the acceptance of a soy soup prepara-

tion in a school lunch program needs to know what the children ate before there was a school lunch, what "lunch" consists of in the community, where soup stands in the menu picture, and, in fact, what the meal pattern is for the group. He will also need to know what the service pattern is at home in order to evaluate accurately the children's acceptance or rejection of food individually served to them or set out in serving bowls, etc. He may not need to know what the seasonal variations in food are, but he would be wise to explore them to be sure they are irrelevant.

Experiments have been spoiled because the experimenter failed to investigate the constancy of supply of some food in the shops or the patterns of delivery at homes. The inclusion of routine background data of the sort recommended in this manual is insurance for students against spoiled experiments, besides providing for some addition to knowledge from each investigation.

A. SUGGESTIONS FOR THE COLLECTION OF DATA

The basic question. Scientific inquiry advances as the correct questions are asked, and whole periods of scientific research may be wasted in blind alleys if the scientist sets out to answer meaningless or wrongly posed questions. The application of science to research in food habits was in a blind alley position as long as the question which it was asked to answer was: HOW CAN WE CHANGE FOOD HABITS?, for this question was a static one. "How can we change food habits?" assumes that a given population has a fixed set of food habits, some of which are incorrect by our standards, and so we wish to change them to an equally fixed set of habits which will conform to the science of nutrition. What can the social scientist tell us, asked the nutritionists and educators, about how to stop the people from eating "A" habitually and make them eat "B" habitually?

Because this was not the definitive question, the answers were extraordinarily unrewarding, and scattered, unsystematic, and sporadic educational practices grew up. The question itself was out of step with modern science and changing technology. It was a holdover from the combination of morality and fixed practice which was the appropriate social behavior in a static rural society of hundreds of years ago. It ignored the facts that people no longer grow up and die where they are born, no longer follow the occupation of their parents, and no longer live as adults at the same level of technical development which existed when they were children. It was a question which derived from the assumption that our existing knowledge of nutrition was final and had the same authority as the religiously enforced morality of 17th century New England.

This question furthermore had no scientific base. It asked how to apply scientific knowledge without demanding the knowledge upon which that application could be based. Instead we must ask first: WHAT IS THE NATURE OF NUTRITIONAL BEHAVIOR? and expect to arrive at a formulation of nutritional behavior abstract enough to be applicable in all known varieties of human culture, with a definite dynamic understanding of the way in which the human organism takes on and uses culturally varying adaptations of the

material environment. We can then alter the applied science question and ask: HOW CAN WE DEVELOP FOOD HABITS WHICH HAVE THE REQUISITE STABILITY AND FLEXIBILITY APPROPRIATE FOR GIVEN INDIVIDUALS IN A GIVEN SOCIETY AT A GIVEN TIME? This question has general validity and still is congruent with the climate of opinion of our time.

There was no way of answering the first question, because every answer had to be given locally, in terms of how to persuade a Georgia sharecropper to eat lean meat, or school children in Bridgeport to drink milk instead of coca cola. The local, immediate, time-and-space-bound end result desired had to be stated, as well as the disapproved condition from which the individuals were to be moved. Moreover, the question assumed that the applied scientist would operate upon a given identified group of individuals, that he would change persons directly, not that he would change a *system* of education. Yet any assumption which makes individuals, rather than a part of the social process, the object of social change tends toward the type of authoritarianism in education and political practice which is incompatible with democracy. HOW CAN WE CHANGE FOOD HABITS FROM EATING NATURAL FOOD TO ERSATZ FOODS IN PREPARATION FOR A WAR? would have been an appropriate question for the German Reich in 1936. HOW CAN WE DEVELOP FOOD HABITS WHICH ARE BOTH STABLE ENOUGH AND FLEXIBLE ENOUGH SO THAT OUR PEOPLE WILL BE ABLE TO ADJUST POSITIVELY AND MAINTAIN ADJUSTMENTS TO WHATEVER FOOD CONDITIONS EXIST? is a question which is consistent with the application of science in a democratic society. The specific answers to this question will be based on a knowledge of the culture, particularly of the state of food technology, of the way in which learning to eat is bound up with other types of learning, of the state of the science of nutrition at a given date, etc. The answer to the question can be given in a form which is dynamic, that focusses on developing social forms which promote and conserve adaptability within human beings rather than upon the alteration of concrete and specific habits in identified individuals.

B. THE UNIT OF STUDY

The unit of behavior for a study of food habits is not the food, expressed in terms of international units or specific nutrients, nor the human being exercising will power in making proper or improper choices, nor the amount of wages available per family per month. It is a *given human being* (whose whole behavior has been modified by his social experience) *consuming a given item of food* (the constitution of which has often been modified by human means) *at a given place* (where the availability and quality of the food will have been determined partly by local geographical conditions and partly by man-made improvements that will include the import of materials such as fertilizer or new types of seed, or the import of foodstuffs from another locality) *at a given period in history* (with the climatic and social conditions characteristic of that period).

If this unit be accepted as the suitable basis for research in the field of food habits, it follows that no statement is complete which does *not* include:

identification of the food eaten so that it is possible to state that food in terms of nutrients; identification of the human being eating the food so that it is possible to define him further in terms of the entire body of cultural practices which he now embodies in his behavior; identification of the place from which the food comes or, put another way, the position of the human being in a food production and distribution system; the exact time at which the act under analysis is taking place.

Although many additions to the study of food habits can be made by an adequate description of parts of this material, their usefulness and adequacy will be a function of the student's recognition of and allowance for the missing parts of the data. The student who is primarily interested in a state of vitamin deficiency may not have the techniques with which to make a study of the cultural attitudes toward food of Italian-Americans who are his subjects of study. If, however, he indicates the extent of the data on the subject and systematically recognizes his omissions, his results become a great deal more valuable.

It is furthermore important to realize that a human body is always involved in food habits and that fully to understand such habits the whole body, with its organized method of ingestion, digestion, and excretion, must be considered. The abstraction "food habits" must never be made so abstract that the actual constitution of the given food and the structure and function of the given human body are eliminated. Such unfruitful abstraction prevents an applied science from having those close and continuous relationships to human living which are essential to its actual application. Conceptionalized statements of populations with a given age and wage range consuming a given average of calories would, for instance, simply obscure all of the realities of differential impact of a food shortage. The device of always including identified human beings, members of an identified society, at an identified time eating identified foods, is an insurance against the development of the frequent gap between science and living, which studies like that of food habits aim to bridge.

C. DATA ARE BASES FOR ACTION

The study of food habits is important because action is contemplated in terms of the results. Action in a field like this can be taken only on the basis of concrete knowledge. We need to know what sections of the population have what type of food habits, so that steps can be taken either to preserve them or to change them, in part or altogether, in order that the population in question will make better use of the available food supply and so that the habits of utilizing food do not interfere with other types of valuable adaptive behavior. All principles involved in making a given change or conserving a given habit should be culturally based principles. Experience has shown that the attempt to think through problems of food habits in a cultural vacuum, in terms of abstract psychological principles, is unrewarding. All controlled social change is directed toward changing particular habits of a particular people at a particular place at a particular time.

Actual research in food habits will be conducted by a great many kinds of

people, by graduate students, by field operatives in food programs, by students of opinion and attitude, by experimental psychologists who find the field of foodways and food habits a good setting for research. If the masses of data which are accumulated in these various types of research are conserved in the concrete form indicated above, then every investigation, however temporary its basic orientation, or however remotely theoretical its primary problem, may be expected to add some useful data to our growing knowledge of the food habits of the peoples of the world at different periods of history.

D. FORM OF THIS MANUAL

For purposes of discussion, studies of food habits will be divided into two types, *observational* and *experimental*. These two headings correspond roughly to the more usual methods of cultural anthropology and psychology. In observational studies the student does not attempt to alter the situation in any way and does attempt to allow systematically for his or her presence as an observer.³³³ Data are accumulated by the systematic collection of observations made in terms of definite hypotheses and principles of organization. Problems are solved by finding real life situations in which the conditions necessary for solution exist. For example, if the student wishes to know the effect of extreme maternal indulgence upon children's attitudes toward food, he may find and study cultural groups in which the mother is indulgent, e.g., Italian, and compare them with groups in which food is used in a moral and disciplinary fashion, e.g., traditional New England. He takes existing situations and studies them.

Similarly, Dr. Hilde Bruch's study⁹³ of the family frame of obese children is an observational study, in which she made systematic observations upon the homes of a series of obese children and drew her conclusions from the regularities which she recognized within those home conditions as compared with other types of homes in the same society. Such observational studies are particularly useful in a field in which experimentation is very difficult because, unlike laboratory experiments in memory or learning, there is difficulty in managing the food closely, the subject is unable to consume food without altering his reaction to the next item of food, etc. Furthermore, because all experiments on human subjects are conducted upon human subjects who embody a highly patterned attitude toward food, observational studies of that pattern, in its historical, national, regional, familial, and individual aspects, are essential to an adequate evaluation of all experimental results. Results of experiments on Chinese or German subjects have to be interpreted against the whole cultural background of China or Germany before they become applicable to individuals from other cultures. So Part III, "Context for the Collection of Data," is at once a frame of reference for purely observational studies and an indication of the *type* of cultural consideration which any experimental study must take into account.

In the "Context for the Collection of Data" no attempt has been made to provide an exhaustive list of points which must be observed or questions which must be asked. The moment that a rigid list of headings is accepted for the

observation of any ongoing cultural phenomena, the student's observation is so restricted and narrowed that the new insights which a more unpatterned and free observation would have provided are lost. The list of main headings is a list of aspects of the food pattern that cannot be ignored. They are essential for every complete study of foodways and any one of them may be germane to a laboratory study. For instance, studies in the degree of selectivity that human subjects exercise among different foods may have to be referred back to the method of production, the conditions of fertilizing, etc., under which those foods were grown, or the methods of processing and storage through which they have passed.

Beneath each main heading there are a series of annotations, designed to create an awareness in the student of the type of observation he will want to make, to focus his attention on observations relevant to food habits, to widen his estimate of what is relevant. To go further than this, to publish outlines, questionnaires, and schedules, would mean freezing a field of inquiry which must of necessity remain ever changing and flexible. While no two inquiries should use the same schedule or ask exactly the same questions, from every inquiry a body of exactly described and carefully recorded data should result, of such a nature that it can be usefully added to our growing store of knowledge.

PART III

CONTEXT FOR THE COLLECTION OF DATA



III. CONTEXT FOR THE COLLECTION OF DATA

A. OUTLINE OF CONTEXT

I. THE FOOD PATTERN

a. General Description of the Food Pattern.

Such a description will include the basic cereal (as among rice-eating peoples of the Orient), if the food pattern is one to which a cereal is central, or the basic protein core of the diet (as among the Eskimo), or the type of balanced pattern characteristic of our own diet. The principal foods which accompany and supplement the core foods and the characteristic beverages also constitute part of this basic pattern. Distribution of food consumption throughout the seasons and the unit of time within which the detailed food pattern repeats itself should be distinguished. The degree of uncertainty of any important element in the diet and the consequent limits of variation due to crop failure, conditions of employment, rhythm of employment, etc., should be stated.

Whenever it is available, a nutritional evaluation of a diet should be considered, combining with identifications of the actual foods eaten an evaluation of the nutrients received from each, deficiencies and sufficiencies in essential nutrients, and estimated caloric intake. Very often such estimates have not been published; they lie somewhere in a government committee report or as background for a board of health program. The field worker in food habits should unearth them if possible, because they will add enormously to the significance of the data ten and twenty years hence. Retrospective calculations, without specific data, on the essential nutrients in a diet which is no longer eaten, samples of which are no longer available, and methods of preparation for which have been lost, are likely to be far less accurate.

b. Type of Production.

Is the food supply the result of large-scale commercial agriculture within or without the country, locally grown for a local market, home-grown for home use? Are foods available only from one area where both plants and animals feed on the same soil, or is the food produced in many different regions or countries? Does the food come from one or several types of agricultural production, involving different scientific theories of agriculture, different types of fertilizer, types of plant and animal genetics, etc.?

Note: For the student of the foodways of a society, actually the whole of agricultural production would enter as a subject of study, but for the student of food habits, the type of production has far less detailed importance. For later evaluation of his material, it will be useful to know whether the vegetables which his subjects eat come from local poor soil or from some distant scientific truck farm, arriving after several days or weeks cold

storage in transportation; whether the fruit they eat has been developed for size at the expense of vitamin content, etc. If taste factors enter into the study, it will be important to know, for example, whether fresh local vegetables constitute the subject's idea of what is a vegetable and whether all of the pork that a subject has ever eaten is locally grown and cured.

In the United States there is a distinct difference in the potential mobility of individuals reared upon a food supply which draws upon a wide variety of distant sources—our typical urban food supply—and individuals whose food habits are tied to locally grown, locally processed, regionally distinctive foods. If problems of interest and attitude to certain foods are involved, the relationship between the grower and his food is very different from the relationship of a buyer to food grown by someone else. In case of locally grown foods, individuals may identify enough with the prize local fruits and vegetables to be able to eat them as if they had grown them. Such problems as the inclusion of vegetables in men's diets involve considerations of this sort.

c. Type of Preservation of Foods.

Under this heading we have the whole gamut of food preservation from such traditional routine procedures as the milling of grain and the cold storage of meat to the most modern methods of processing fruits and vegetables, freezing, dehydrating, etc. In the United States we find all the variations from home-grown and home-ground meal in remote regions through home-grown grain ground at a local mill, flour from the national market purchased in sacks carrying a nationally known brand, flour always purchased in some further processed, e.g., self-raising form, flour never purchased except as bread and cake made in a local bakery or coming from a nationally known bakery. Obviously the individual's relationship to "bread" is exceedingly different under these different types of processing, varying as to whether he or members of his family play any active part at any stage in the processing. For a nutritional evaluation it is also important to know what type of processing lies behind a statement that an individual eats about "5 slices of bread a day," as collected on a routine food habits questionnaire.

Nor can it be assumed that the movement is all in one direction, away from locally produced, locally processed foods toward nationally processed food. Such institutions as the "food locker" have been spreading rapidly over the United States, but would not normally be included in any routine study of children's food habits in a school in a small Middle Western town. However, they are altering the degree of family planning and participation by making decisions as to what foods are to be processed and what foods are to be preserved in the family locker. The trend toward home gardens is another obvious example of the same tendency.

So for any study of food habits it will be necessary to know what type of food preservation is involved in the foods eaten, and what the individual's participation is in that preservation. There is no sharp line between food preservation and food preparation. When plums are made into jam they are

obviously both preserved and prepared for eating, but in any given group of people distinctions will be found, as to whether the housewife's home canning is equated with her routine cooking or with a major agricultural activity.

d. Type of Distribution.

Is the food which comes on the table grown or exchanged or purchased? Is it part of the "furnish" allowed by a landlord to a sharecropper, or food which can be charged at the company store against a miner's or a millhand's wages? Is it bought in large quantities when the money for a cash crop comes in, as a barrel of flour or a side of bacon, or purchased in five- and ten-cent lots several times a day? Is the housewife's shopping of a type which differentiates the food, i.e., does she go to the farmers' market for fresh vegetables and dairy products, get her fish from a fish market and her dry staples from a chain store, or does she buy all of her food from one general store with very little sense of shopping for quality or price? Are certain foods like milk and bread delivered, so that the pattern of diet is affected by the greater availability of one brand or type? Does the housewife shop by the week and vary her meals against a well-filled larder, or does she improvise each meal? Who shops—housewife, children, husband? Is shopping done by quality, price, or brand? Is the food bought packaged or loose, so that more sorting has to be done in the home?

All of these variations make an enormous difference in the formation of food habits. If a given meal comes from a large supply of food and the children know that "that barrel of apples is mighty sour," or "that side of bacon is too fat," this engenders a very dissimilar type of acceptance from the imperious relationship to the "butcher who sent me those ridiculous lamb chops." The pressure upon individuals to eat a given dish or meal, the terms on which they are willing to do so, the attitude toward monotony, the insistence upon standardization of product—all these will vary with the way, the form, and the time scale in which food enters the home.

The nutritional value of the food eaten will also vary as to where the point of control lies. In purchasing a can of string beans, the housewife can only choose between brands which themselves are based upon standards of beauty rather than nutrition. Her maximum wise choice must be whether to have a canned or a frozen or a fresh vegetable. If, however, she shops in a market, she can choose among fresh vegetables as to their degree of freshness. If she has only canned beans left in her jar closet, the family will have to eat beans or no vegetable at all. So in any study of channels by which food reaches the table and who controls these channels, knowledge of distribution is essential.

e. Type of Food Preparation.

The amount of preparation which goes on inside and outside the home is the first major variable to consider here. Where food is home-grown and home-processed, methods of cooking and serving constitute the end of a self-contained sequence, are closely related to the steps that go before, and

are difficult to alter except in relation to that sequence. For example, the length of time that a woman on a farm cooks her vegetables may be related to the time at which she gathers her vegetables from the garden. When she is an urban woman who shops, it may be related to the time of day at which she likes to shop. If she orders foods from her home over the telephone, it may be a function of the delivery system or of her favorite radio program, completely disconnected from any other process related to food.

So the first statement to be made would be whether the food is bought already prepared, as from a delicatessen, supplemented with canned and frozen foods, and merely served in the home; whether there is a certain amount of routine cooking on the top of the stove, as in defense housing or crowded urban living with single electric plate cooking; or whether the housewife not only fries and boils, but also roasts and bakes and prepares foods which involve a long time sequence and a series of elaborate steps. Extremes of this sort can be found between the habitual diet of the British working class—bread, margarine, tea, fish and chips, with a joint on Sundays—in which a minimum of actual cooking is involved, as compared with traditional Czech cooking still found among Americans of Czech descent.

Where a food habit questionnaire or check list might contain the word *cake*, with allowances for frequency and preference, it will make all the difference in the world whether that cake is bought in cellophane from the general store, purchased from a fancy bakery, baked by the housewife from her one cake recipe, or whether it represents to the subject a richly patterned variety of different types of cakes for various seasons and ceremonies. In any cross-section of Americans, all of these types would be represented, and to sum it up under "65 per cent of the subjects ate cake more than once a week," is an arid statement, both culturally and nutritionally.

For any study of food habits, something about food preparation in the home is necessary, and if the study is directed toward any final nutritional assay of intake, detailed knowledge is necessary if any estimate is to be made of the nutrition derived from the food. The most meticulous food consumption study which weighed the food before it was eaten and weighed the waste, but did not take into account the method of cooking, temperature, length of time, disposal of fluids, etc., would give a distorted food picture.

If a change in dietary practice is to be made by changing the *method* of food preparation, then a great deal must be known about it, including the housewife's schedule, the way in which food preparation tasks are related to her other tasks, care of children, work on the farm, gainful employment outside the home, participation of other members of the family, extent to which her own sense of prestige and adequacy are tied up in her cooking abilities, clash of ethnic food patterns within the home (as when the husband comes from one foreign background group, the wife from another), class typing of various types of activities, e.g., in certain sections of society a "lady" may bake cake or make jams, but perhaps not cook a meal or bake bread.

f. *Type of Food Consumption.*

In a sense, the whole study of food habits is a study of food consumption. But it is necessary to differentiate from the type of food consumption meant here two types of studies which fall into different technical fields. If it is necessary to know just how much of each food an individual or a household actually purchases and consumes, this can be done only by very elaborate quantitative studies which include accounting for all the food on the shelves at a given period. Methods like those used by the Bureau of Human Nutrition and Home Economics^{592, 593, 595, 607} provide such an exact study of what is used by households of different economic level and region. More detailed nutritional surveys that seek to connect what is actually eaten with the nutritional status of individuals or groups must include, in addition to assays of the food itself, even more detailed measurements of the exact amount actually eaten by the individual. These can usually be obtained only by weighing the food before it is eaten and weighing the amount not actually consumed.^{410, 665}

Both types of quantitative food studies, those with a food economics slant and those with a nutritional survey slant, are outside the field of food habits proper, although each type would be greatly illuminated by a parallel study of the pattern of food habits of the groups studied. The food economics study can show what people spend on food, the exact quantity of food they buy, and what they eat for each meal, if provision for checking the consumption at each meal is included in the research. The nutritional status type of check on food actually eaten can also say what an individual or a group of individuals eats for each meal. A food habits study would add what their idea of a meal is, whether they are eating what they think is appropriate and suitable, where and under what conditions and in terms of what appeals they would be willing to change that meal, how rigid or how flexible the whole pattern is, etc.

Under type of consumption, then, would be included the whole qualitative detail of the food pattern, what foods are eaten, at what seasons, for what meals, under what circumstances, in what combinations. For urban communities, the pattern of consumption is becoming increasingly independent of season as canned and frozen foods replace fresh foods. In higher income groups, only the survival of earlier food preservation practices gives a seasonal patterning to such foods as oysters. Lower income groups are to some extent still dependent upon season, since it determines price.

While seasonal patterning of food is virtually disappearing in cities, meal patterning remains fairly rigid for all except very low income urban and rural groups. Breakfast is usually highly differentiated from the other two meals, and food is thought of as "food for breakfast" or "not food for breakfast" to such an extent that failure to take meal patterns into account would defeat any nutritional program. Odd-shift workers who fail to eat a meal labeled as "breakfast" simply lose out on certain nutrients.²¹⁸ Wherever possible it is important to record the *ideal* for each meal and the usual practice, as well as, where these ideas are clear, the foods which are *not* appropriate for a given meal. For instance, young Americans who lack a New England tradi-

tion may reject pie for breakfast. Eggs and bacon may be regarded as appropriate; cereals may be regarded as only breakfast foods.

In studying meal patterns it is not sufficient to give a series of menus, but necessary to find out what the divisions are in the minds of the people who eat those foods, what is meant by a "course," a "main dish," "dessert," "beverage." Is milk for small children an analogue of coffee or of water, or is it a food? What is the position of orange juice and tomato juice, and when are they analogues of an orange, a cocktail, or a plate of oysters? What is meant by the category "spread," in which various types of food, sweet, sour, tart, sharp, bland, nutritionally different, are all classified as a "spread" for bread? What foods constitute a "snack" rather than a meal, a "lunch" to be carried?

Thus there are three distinct approaches to the study of food consumption: 1) the study of the food consumed, by whom, when, and under what circumstances, which requires the techniques of the "food economist"; 2) the study of the exact nutritional quality of the food consumed and the effect upon the person consuming it, which requires the special techniques of the "nutritional survey," including biochemical assays of the food eaten, the effect of the methods of preparation used, measurement of the portions consumed, and clinical studies of the individuals; and 3) the study of the pattern of food consumption, of the ideas and concepts which the consumer has about the use of food, which is the problem of the student of food habits.

g. Type of Post-Food Consumption Practices.

The disposal of waste is a topic that, except in wartime, has been regarded as more the function of public health than of nutrition. Yet if the food biochemist discovers that a given method of boiling a vegetable means that certain nutrients escape into the boiling water and can be conserved only by using that water, then the housewife is urged not to waste the water but to use it. Thus the borderline between what is a leftover, to be eaten at a less important meal, and what is waste—something to be given to those who are considered members of a lower order, servants, members of another race, pets, domestic animals, farm animals, or to be discarded altogether and buried, burned, or carried away by the garbage man—is a shifting line, depending upon custom, scarcity, and the state of nutritional knowledge. But unless it is known how a given group of people regard an article or a type of food—cold boiled potatoes, the ham bone, skim milk, beet tops, vegetable water—when it is classified as no longer fit for the main meal, or main table, or chief human inhabitant of the household, it is very difficult to persuade people to eat these hitherto rejected foods.

Human attitudes toward leftover foods are very different if the foods are mixed up into a mash for chickens or pigs, fed to the dog in a corner of the kitchen, dumped into a large, never-cleaned unsavory garbage pail, or deposited in a paper bag and thrown immediately down an incinerator shaft. Very different amounts of rigidity in both the utilization of previously discarded items of food and attitudes toward new and unfamiliar foods may be

expected, dependent upon the type of dishwashing and garbage disposal which individuals experience in the home. Greasy, dirty dishes left to accumulate in a sink build up attitudes toward food itself. Willingness to purchase fresh vegetables which result in a large amount of garbage may be determined by the type of garbage disposal available. Unwillingness to wash dishes after a fish meal may be responsible for rejection of fish in the diet.

Most importantly, leftovers tend to become associated with other forms of discarded food. Husbands refuse to eat them; people of low economic status give up eating leftovers as soon as they make more money; people reject dishes in mass feeding situations which look as if they had been made from leftovers; and the whole pattern of food acceptance and rejection hinges upon methods of waste disposal in the home.

A minimum statement would include current methods of garbage disposal, whether servants took leftover food home, whether chickens were fed scraps from the table, and general attitudes toward leftovers, as appropriate or inappropriate for men's lunchboxes, children's lunchboxes, the noon or evening meal, etc.

2. SOCIAL ORGANIZATION OF FOOD

In any study of food habits, some minimum statement of the way in which the production, preservation, and distribution of food are organized is necessary as a background.

a. Division of Labor.

Depending upon the type of subjects or population, it will be necessary to know something of the division of labor between the home and outside agencies, between husband and wife, between employers and servants, between parents and children. In an agricultural community, this will involve division of labor in regard to production. If the food habits of an urban industrial population, without gardens or lockers, are being investigated, it will apply only to division of labor in planning, shopping, preparing food, and disposing of waste. Unless it is known whose is a given task, it is very difficult to influence or change the way in which the task is done. Who does a job also gives clues as to the relative prestige of different jobs in connection with food, whom to educate, and where.

b. How Food Is Patterned in Relation to Social Status, Caste, etc.

In almost every culture only part of the available food supply is actually used, and that part is also differentiated; some foods are rarer, finer, more delicate, more desirable, more expensive than others. Wherever the society makes social distinctions between individuals or groups of individuals, there is a tendency for these distinctions to express themselves in foods eaten, or believed to be eaten, by other groups. Immigrant groups in the United States are frequently characterized in terms of some unfamiliar food on which they are reputed to live. Certain foods, especially foods which are inexpensive and adequate substitutes for more expensive foods, may become associated with

low social status and so rejected, particularly by the members of the next higher social group. White bread, plentiful white sugar, and meat every day were symbols of high social status in Europe and became increasingly accessible to European immigrants in this country. Their position in the social scale accounts for some of the changes from European food habits in this country and also explains the stubbornness with which many people cling to white bread.

In each region, and in the large cities on an almost national scale, there are foods which are regarded as appropriate for one's own class, and others for other classes. While most or all of the individuals of a given group may fail to obtain the socially appropriate food, they may nevertheless go to great lengths to conceal this fact. Any study of food habits should take into account this class-typing of foods, which includes, of course, not only the food itself, but methods of purchasing—"I've dealt with Mr. Jones for years and he knows what kind of roast we like"—and methods of preparing food and ways in which it is served. Through the magazines, the moving pictures, the radio, and the schools, children of deviant groups learn what are the approved foods and meal arrangements of food, and often consistently falsify records of what is eaten in their own homes in order to conform to the nationally approved picture.

Attempts to introduce foods or methods of preparation which have not been incorporated in the national or regional ideal picture will often meet only with resistance. In every case where a study is to be made, this picture and its local variants, as well as actual practice, must be known.

c. How Food Is Patterned in Relation to Physical Status, Age, Sex, Pregnancy, Illness, etc.

Almost every society has recognized that because of the close connection between food and the body, different states of the body might be appropriately symbolized and controlled by food. Particular foods for infants—taboos on all food except milk, special preparing by chewing or pounding, or special selection of foods for infants—are found almost everywhere. Today beliefs about infant feeding are a conglomerate of folklore and variant pediatric practice, and a point of great conflict between generations, especially if the grandparents come from another society. If certain foods are regarded as baby foods, or female foods, or convalescent foods, this labels them for the members of the society who are not in those categories. So soft foods become classified as "slop," milk as baby food in many groups, salads as feminine food suitable for the female who is reducing.

Such practices as a taboo on eating large strawberries, which will "mark" the child, and a pattern of eating a double chocolate nut sundae after being weighed in the prenatal consultation room become increasingly important as more is learned of the importance of nutrition during pregnancy.^{213, 214} Dietary standards for the sick and convalescent become more and more a matter of professional concern of physicians and dietitians, but the way in which those

who are not ill view these precautions remains a determinant of their acceptance of new foods or foods not eaten formerly.

Every increase of knowledge in scientific nutrition will serve to differentiate the food for different bodily states more accurately and at the same time increase the conflict between classifications which are based on folklore and those based on science. Taboos on the mother's eating meat after parturition still exist in this country and seriously reduce the new mother's protein intake. Nutrition for the aged runs directly up against the resistance of the aged to being classed with infants in regard to certain types of food intake.

How food is apportioned within the community or within the family may also be very important whenever a near-subsistence level is reached. Studies in Great Britain and Canada and material from first generation European families in the United States show how uneven is the division of food between the head of the house, the wife, and the children. In some cultural groups the eldest son or the favorite child or the invalid member will be given far more than his share. During periods of scarcity, as in the United States in 1942-44, shopkeepers will favor customers who have been the most generous buyers, and so different types of food, sometimes of high nutritional significance, will be unevenly distributed throughout the community. Relationships between wholesalers and retailers will also pattern themselves on earlier relationships, and certain areas, such as new settlements or poorer neighborhoods, suffer. Such differences as these tend to be obscured by the type of economic study which deals in the amount of food available in a large area or the per capita consumption of food.

d. Social and Ceremonial Role of Food.

Whenever food becomes part of the celebration of a holiday, the observance of a religious feast, the mark of some life crisis such as a funeral feast, the setting for some business transaction or for the maintenance of social position, a great many reenforcing factors enter in to make certain foods valued and others disapproved or reserved for special occasions. Resistance to a whole series of suggested dietary changes may be traced back to fear that the special Sunday dish or Christmas dish will also disappear, and very often, notably in mass feeding situations such as in schools or camps, the token inclusion of some one highly valued dish will remove objections to a great number of other changes. The familiar diet is often symbolized by the feast dish. The social importance of an occasion demands celery and olives on the table. Whether or not certain foods are "company foods" varies from class to class and from region to region.

Reactions of people not only to nutrition education, but also to price changes, government controls such as rationing, action of the commissariat on a ship or in the army, may be heavily conditioned by the presence or absence of one ceremonial dish, whether it be a birthday cake, turkey for Thanksgiving Day, ice cream on Sunday, or fish on Friday. The more conspicuous relationships between religion and food, such as the dietary laws of orthodox Jewry or the Catholics' fast during Lent, are usually taken into account, but students

should realize that in the less prominently patterned life of the United States there are also a great variety of ways in which food is woven into our social ceremonial, and these complicate any sort of group cooking, mass feeding, and naïve nutrition education.

e. Food Etiquette.

In the course of learning to eat, heavy sanctions are used to make children reject some foods and accept others, eat in certain ways and refrain from eating in other ways. A background of disgust and sensitivity is built up while the child is being taught to feel that eating with his knife, or blowing his soup, or sticking his personal spoon into the serving dish are major offenses. Out of this stringent training, which occurs in some form in every society, usually increasing in intricacy but not necessarily in emotional strength with increased social status, there develops a great deal of rigidity in table etiquette.

Food may be rejected if it is not presented in the habitual container or with the habitual gesture.²²⁷ New foods may become associated with old foods by the way in which they are served. Changes in ways of eating may be effected by changing the etiquette; introduction of a blessing may result in a family, who always ate standing, sitting down around a table; getting the housewife to sit down and serve the vegetables instead of waiting upon the menfolk may mean that she gets a better share of the meal; taboos on little children coming to the table may mean better or worse food for them. Adults may be unable to eat in strange situations in which a different type of table covering or cutlery or dishes is used, unable to drink coffee from a cup without a saucer.

So the whole gamut of what we think of as "table manners"—including when and where a table is set, how it is set, the way and order in which food is served, by whom, to whom, in what type of dish or container, how it is eaten, with what sounds and gestures, etc.—is important in understanding local food habits or attempting to change them.

3. IDEOLOGY OF FOOD

a. General Attitudes toward Food.

Under this heading we might include the whole patterning of food by time of day, season of year, religious and patriotic events, social status and caste, which have been dealt with elsewhere. After these various topics have been covered, there will remain a series of general abstractions which can be made about the culture of any group of people, or the personal version of that culture expressed by any individual, in their general attitudes about food. Such phrases as "Man does not live by bread alone," "An army marches on its stomach," "Bread and circuses," "A well-nourished nation is a contented nation," all express general cultural attitudes toward food.

b. Basic Phrasing in the United States.

In simpler societies and during periods of war and scarcity or economic depression, food may become a major consideration around which virtually

everything else hinges, but in our own society we do not assume that food anxiety should ever legitimately occur. We do not think of the problem as *how to get food*, but as a question of *what people ought to eat* for health, growth, and efficiency, and of how much indulgence they may permit themselves in eating foods which are pleasant but which they ought not to eat if they take proper care of themselves. This attitude underlies our nationally expressed attitudes toward food, but there are many local and regional versions and variations expressed in attitudes carried over from Europe.

c. Regional and Other Variations.

In the Southeast, personal liking for food and the food's agreeing with the individual is more strongly emphasized. In California, health is a major goal rather than the duty which it is felt to be in other parts of the United States. Among workers in heavy industries certain quantities of food are felt to be their due as a given type of workers, while for women clerical workers who lack any social life food may become the only pleasure which they recognize. Food may be a subject of absorbing interest, as to some Europeans, or a subject of boredom and acceptance. Pleasure and good nutrition may be seen as opposed or as combined in an individual's food behavior. Where there is a strong cleavage between the acceptance of official ideology about food and actual preference, there is less guarantee of a well-nourished population than where pleasure and correct eating have been combined. Such a situation was found in a projective test given to Cedar Rapids children,³⁴² where they put such foods as green vegetables and fruit juices under the heading "Swell," and candy, cake, ice cream, and hot dogs under the heading "Terrible."

d. Nutritional Theory Influences Social Change.

With the rapid diffusion of knowledge of scientific nutrition, this knowledge and attitudes toward nutritional theory itself and the official practitioners—nutritionists, dietitians—have become part of the ideology of food and determining factors in social change.

e. Cultural Classification of Foods.

Another aspect of the ideology of food is the way in which edible materials are classified as inedible, edible by animals, edible by human beings but not by own kind of human being, edible by human beings such as self, and finally edible by self. These classifications are further reenforced by various sorts of attitudes—that materials which are not eaten are defiling, wicked to eat, coarsening, would alter one's social status, etc. A second type of category is found in such culturally dictated classifications (sometimes informed by a little physiological knowledge) as foods that are "heavy" and "light," foods which provide strength, influence the course of pregnancy, etc. Finally, all types of local classifications into essential and luxury foods, primary and secondary foods, old and new foods, farm and store foods, etc., may be important in understanding the food behavior of a given group of people.

f. *Symbolism of Food.*

In most cultures food is also used symbolically, either actually as in communion meals or in the figures and images of speech. Such phrases as "the wine of life," "the blood of the grape," establish cross-references to wine as blood and set up a multiple set of reenforcements of the attitudes toward wine. There is an Italian saying, "As good as bread," and bread recurs as a symbol in a variety of social and religious contexts.

g. *"Food Habits" Is a Culturally Limited Concept.*

The concept of "food habits" as used by practitioners in our society is not a scientific abstraction alone, but contains within it our cultural attitude toward food and implies 1) that there are two kinds of food habits, good and bad; 2) that each individual must make a moral effort to decrease his bad habits and increase his good, i.e., nutritionally acceptable, habits; and 3) that good dietary practices must be reestablished against odds in each generation.⁴⁰¹ Thus every culture will be found to have its own interpretation of the disciplines of medicine and nutrition, and in making any study of food habits it is necessary to know what these interpretations are.

4. INDUCTION OF THE NEW GENERATION INTO THE FOOD PATTERN

a. *Developmental Approach.*

A food pattern, that is, the food habits of a group of people, seen systematically as part of their social tradition, may be studied by the observance of adult behavior, combined with introspective accounts of childhood memories and the expression of attitudes toward the care and feeding of children. But another and especially useful dimension is provided by a study of the way in which each new organism, born without any system of habits, is reared so that as an adult he will approach food in a definite way, become hungry at definite times, for particular combinations of food, have definite attitudes toward food and those who give it to him or withhold it from him, and rely for his continued healthy existence upon this culturally patterned set of habits. Biological hunger is transformed into culturally patterned appetite.

b. *Infants' Early Experience with Food.**

What is the infant's initial experience of eating? Is it nursed, fed lactose, starved until the mother's milk has come, put on a formula at once? Is it breast-fed and weaned to a bottle, breast-fed and weaned to a cup, weaned suddenly or gradually, and how? Is it supplementary-fed, and with what foods? Is the supplemental feeding—additions to a milk base to complete a formula, orange juice, cod liver oil, etc.—regarded as "food" or as "medicine"? Is the infant fed indulgently or with routine, emotionless practicality?

Is the child given any substitute for the nipple, such as a rubber pacifier or a bit of cloth soaked in sugar? What is the attitude toward thumb sucking?

* See Partial Index to Alphabetical Bibliographies, No. 5, Studies of Children, for references to studies focussed on children particularly.

Is the child always fed in the same way, by the same person, at the same times? In what form are foods other than milk introduced, mashed, chopped, etc.? How is teething patterned—is the child given hard food or some hard non-food object on which to cut its teeth? How early are table manners insisted upon? What sanctions are introduced to keep the child from eating too much, to train the child to eat certain foods? Are certain foods devalued by bribing the child to eat them and other foods enhanced in value by being used as rewards and presents?

c. Elimination Patterns Affect Food Attitudes.

What are the cultural practices in regard to elimination? For the developing child intake and excretion must be organized into a systematic relationship with food and the world, and later attitudes toward food, especially food rejections, narrow reliance on particular foods, food faddisms, and gastrointestinal disorders are traceable to the way in which the growing organism is patterned in both intake and elimination, not merely in intake.

d. Parental Attitudes.

How is the process of growing up related to food eaten in such statements as: "You're not old enough to eat that," "He's old enough now to drink milk or not as he likes," "My children are all grown so now we eat what we like"? What is the role of mother, father, nurse, grandparent, brother or sister, teacher, schoolmate, impersonal authority, in food habit learning?³⁴² Do parents alter their food habits when they are rearing young children, and is this phrased as a temporary deprivation? Is eating a pleasurable or a distressing experience? Are feeding problems frequent?

A careful outline of the whole process of lactation, weaning, learning to eat and to control eliminations, learning to eat at the right time, in the right place, in the right way, for the right reasons, will provide the background for a much greater understanding of the psychodynamics of food habits in members of any society.

5. MATERIAL CULTURE AND TECHNOLOGY OF FOOD

a. Utensils and Tools.

Every phase of the food process, from production through post-consumption practices, has its utensils and tools, which not only implement that stage in production but serve also to standardize and perpetuate that type of food behavior. In any study of food habits it is necessary to judge what part of the system of tools and utensils is actually involved in the situation. These may be found to be merely the utensils of eating and the way in which knife and fork and spoon, cup and plate, have been established in the eating habits of the subjects being studied. If the study includes methods of preparing food, then at once stove and pot become of primary importance.¹⁸⁴

b. Type of Building and Room Facilities Used in Food Processing.

No adequate description of the food pattern of a group of people can be given without a description of the kitchen and the buildings concerned with food processing and storage, the utensils, the form of heat, the time schedule of operations within this material framework, etc.

c. Realistic Adaptation of Methods to Available Cooking Facilities.

Very often methods learned in special classes, in schools, or advocated over the radio or in newspapers are totally incompatible with the actual physical conditions under which food is prepared and eaten in a given home. Dishes which require three saucepans to prepare are recommended to women who have only a frying pan, roasting to those who cook on one electric plate, quantity buying to those who have one open shelf for dishes and food, large cuts of meat to those who either do not have or cannot afford to use an icebox, elaborate lunches to those who carry their lunches in paper bags to meet plant gate inspection rules or local fashion in high school lunches.

d. Material Culture Data Necessary for Comparison with Other Cultures.

Food habits always have a material culture aspect—a tool, a utensil, a container, a place in which the given food is prepared, dispensed, or eaten. All descriptions of this material culture should be accurate enough to be permanently valuable and useful in making comparisons with other cultures, and the student should not rely upon trade and brand names, such as “Sunlight Range” or “Marvelous Roaster,” as a method of identification.

6. FOOD PATHOLOGY

There are two major types of food pathology which are important enough to deserve consideration in any study of food habits: 1) the type of deviant social attitude which is expressed in cults and fads, and 2) the type of systematic miscarriage of character formation which results in certain definite forms of psychosomatic disorder centering about gastrointestinal processes.

a. Factors Influencing Development of Cults and Food Fads.

Cults and food fads highlight the culture pattern. A cult like vegetarianism is a reflection of the terms in which we eat certain types of meat and not others, often including within the “unthinkable to eat” category domestic pets or animals closely associated with man. Also the close association of meat with masculinity, reproductive energy, and aggression provides a matrix from which reactions against flesh eating can develop. Excessive emphasis upon habit training in childhood or the invocation of unpleasant looking or tasting substances in weaning furnish a background for the type of diet which rigidly separates one type of food from another. Statements of the findings of science as a great mystery, coming from the House of Magic provide the perfect setting for the magical use of diet to correct every imaginary ill. The use of food as a sanction in moral upbringing—“If you don’t obey mother, you

can't have any dessert"—makes a likely background for the search for an authoritarian and omnipotent leader in the head of a food cult.

b. Cults and Fads as Modifying Popular Acceptance of Nutrition Concepts.

In actual practice the presence of cults and fads, themselves distortions and overstatements of the existing pattern, may also either impede or facilitate change. Scientists may hesitate to entrust more responsibility to uninformed teachers; the acceptance of food fads by personalities of high popular interest may increase the average man's interest in nutrition. A concept of vegetarianism as a pallid and flesh-denying doctrine may decrease male acceptance of more vegetables, etc.

c. Psychosomatic Manifestations and Food Habits.

Psychosomatic aspects constitute a field in themselves. The student of food habits may obtain much insight from a consideration of the more elaborately delineated forms, such as anorexia nervosa, or material on the wide prevalence of gastric ulcer at this present stage in our civilization. Exploration of the character structure of individuals suffering from specific psychosomatic disorders,¹⁷⁹ if correlated with the existing food pattern in the society, provides valuable clues to the psychodynamics of food attitudes.^{399, 405}

Any study of historical change in food habits should include, if possible, the changing disease picture, with a recognition that changes in the incidence of peptic ulcer will be relevant at a different level from changes in diseases which can be attributed to vitamin or mineral deficiencies in the diet of the period.⁴¹⁷

Deutsch's ¹⁷⁹ studies of asthma illustrate the way in which a piece of social behavior, mothers' preoccupation with making children eat the right, i.e., nutritionally dictated, food, coinciding with whooping cough or bronchitis, may lay the foundation for asthma. Studies of allergies have to be correlated with the current practice in early child feeding, immunization, etc. Then too, alcoholism and drug addiction throw light upon and are undoubtedly systematically related to the eating and drinking practices of a society.

Where the results of psychosomatic studies supply valuable insight for the student of food habits, conversely, psychosomatic studies to be fully interpreted must be informed by a knowledge of the culture within which their selected groups of subjects have been reared.

7. THE STUDY OF STABILITY AND CHANGE

a. Direction of Change.

Because the study of food habits is a field of applied science, in which our primary interest is the progressive adjustment of traditional dietary practices to the changing findings of nutrition and medicine, and the continually changing patterns of living and making a living in modern societies, the direction and nature of change in any area under observation should be one important

dimension. Do the people include historical perspective in viewing their own food habits—"Here in the United States we eat meat every day"? Is there actual knowledge of earlier dietary practices, their advantages and disadvantages, and how are these expressed? Are there changes which have taken place in which traditional behavior which was formerly desirable has served to establish or perpetuate nutritionally undesirable behavior; e.g., substitution of synthetic orange preparations deficient in vitamin C for oranges for infants after mothers have incorporated the need for orange juice into their pattern of infant feeding? What are the changes observed in response to new foods, new methods of food preparation, new habits of living, such as a great amount of eating outside the home, new theories of nutrition, new forms of commercial pressure? Are the changes which are taking place expansive, associated in people's minds with improved living conditions, or restrictive, associated with a lower standard of living?

Can present trends be projected forward so as to incorporate warnings in present-day educational practice which may anticipate new complications later? For example, may not emphasis upon what each individual should have at a given age and weight—patterned so that a mother serves each child, or expressed in the form of standard table d'hôte meals or blue plates—however dietetically planned, if carried too far, reduce the area of physiologically dictated choice and present a new problem when experimental materials on man's ability to make physiologically dictated selections become available?

Moreover, the study of changing food habits provides one of the best areas for a study of the dynamics of food habits. Individuals faced with new feeding situations, school lunches, army feeding, industrial feeding, families faced with new types of foods in shops when they move from one area to another, patients attempting to struggle with a diet—all of these give both observational material and a natural experimental setting which is extremely fruitful. Nutrition education programs, methods of giving individual instruction, or promotion of certain foods can be tested out in the actual observable response of individuals in group feeding situations.

What temporary changes due to war or economic cycle are operating, and how are they operating to form more permanent habits of valuation of missing foods or rejections of alternatives and substitutes? How do different contexts—change toward food indicative of higher social status, change toward better food habits, change toward eating more scientifically—furnish different types of leverage for social change? *Under what conditions are desirable food habits best preserved in a changing culture?*

b. The Study of Stability.

While the attention of applied sciences in our society tends to concentrate upon change as areas of both research and application, the study of those stabilizing aspects of culture which permit individuals to acquire patterned and reliable responses must not be neglected. During the socialization of the child, its original biological impulses toward the gratification of hunger are transformed into socially disciplined appetite. It learns to be hungry at

certain times, to sleep long periods without food, to recognize certain foods as appropriate for specific times or occasions, to accept some foods and reject others. These responses insure a positive reaction to familiarly patterned foods for most individuals most of the time, and are a guarantee that the nutritional values which have been embodied in the food practices of a society, either by historical accident or by conscious scientific design, will be available to the individuals who grow up within that society. At any period, whatever the emphasis upon change and improved food habits, there is a major dependence for the nourishment of the people upon their highly patterned food habits.

In studying these factors of stability, it is important to ask in what ways reliance upon familiar foods is patterned. Is the association between food and home made so strong that unfamiliar food produces homesickness and unhappiness? Is the perpetuation of familiar foods intricately interwoven with table etiquette or religious beliefs, so that when these are altered the food itself will change? By restoring some abandoned practice, such as prechewing infant foods to supplement the mother's milk, can an equilibrium be reestablished in the food habits of a group who have displayed extreme malnutrition when some stable factor in their former dietary practices was arbitrarily removed?⁴⁷⁵ How are the various food practices linked together so that removal of one food or one method of food preparation may threaten the place of other foods in the diet? A practically unexplored field is the whole question of how a traditional diet embodies a patterning of tastes which is differentially receptive to the addition of foods which will alter the proportion or sequence of the familiar tastes.

One method of studying stability and change in a society is to concentrate attention upon resistances, upon the unsuccessful attempts to introduce new foods or new food practices, and to try to understand how these resistances operate. Food practices which a people refuse to adopt, even under pressure, may thus be used to throw into relief the positive emphases, and help to define the ways in which the stability manifests itself.

While a certain number of non-valuational observations upon the historical background and direction of change will be essential to any study of dietary practices, change is also the area where normative and valuational considerations enter most appropriately.

B. PLACING A PROBLEM WITHIN THE CULTURAL CONTEXT

Studies of food habits may be arranged along a continuum, as to whether they are primarily the study of the cultural context, in a given section, social group, or period, or whether they are more intensive studies of a limited group of subjects in a controlled situation in which the emphasis is upon experiment or change rather than upon the wider social setting. Among the first type we have studies of American foodways or English foodways which cover a very wide range,^{159, 206} those which concentrate on a more detailed examination of a given area at a given period, such as Cussler and de Give's studies of local Southeastern communities today,^{161-6, 175} and those which

combine a detailed examination of the foodways at a given time in a given section with the invocation of a wider setting of time and space to illuminate further the present local situation, such as studies by Passin, Bennett, et al., of Southern Illinois.^{55-7, 464, 465} In an even more extreme orientation of the total culture to the food quest we have books like "Hunger and Work in a Savage Tribe."⁵¹⁴

In investigations such as these the total frame of reference as outlined in Part III has to be covered, adapted, and amplified for the particular culture being studied. The student relies on a combination of firsthand field observations, written records, statistical summaries, and inferences drawn from records of production and consumption in previous years. The methods used are primarily those of anthropology, sociology, and social history, and the help of the nutritionist is sought when an attempt is made to evaluate the dietary practices, of the economist on the subject of actual or potential resources, of the physiologist if an attempt is made to evaluate nutritional status, the physical resistance, rate of fatigability, etc., of some selected subjects in the area, and of the psychologists to describe the dynamics of attitudes toward food which are systematically observed in individuals who are members of the segment of society being studied.

If records of types of illness are available, especially over a period of time for which other types of records are available, these may be correlated with dietary changes, interpreted by nutritionists (for example, the disappearance of certain types of illness occurring in the spring which were characteristic of earlier periods of American life and which may be related to a decreased vitamin C intake in the winter months), and more subtly still, correlated with the whole system of character formation, if recourse is had to the interpretations of psychosomatic medicine.^{27-9, 179, 208-10, 417 *} In all studies, however, where the aim is to describe the total setting, every heading in Part III is relevant.

I. INTENSIVE STUDIES

While studies of food habits may actually be arranged on a scale of varying degrees of extensity or intensity, it will point up the methodology more sharply to consider how much of the cultural context it is necessary to include in intensive studies on a selected group of subjects within a controlled situation. The inclusion of wider cultural factors may take different forms: 1) an attempt may be made to place a group of subjects, say twenty fourth-grade children in a Midwestern city, within the total cultural frame, as was done in the studies inaugurated by Kurt Lewin in Iowa City and Cedar Rapids in 1942;^{341, 342} or 2) an attempt may be made to include part of the culture of each individual subject in the interpretation of each individual's behavior, the method followed by Dr. Hellersberg²⁸³ in her studies of the relationship between the food habits of college students and the attitudes and educational practices of their mothers as reported on questionnaires.

* See Partial Index to Alphabetical Bibliographies, No. 4, Psychosomatic Studies, for additional references.

In the former type of study something must be known about the way in which food reaches the community and is distributed within it, in what forms of preservation and preparation food can be bought or is habitually prepared in the home; what are the ways in which different classes use food to symbolize their social status; what sanctions are used in the home and at school to persuade children to eat certain foods and avoid others. Some historical depth is likewise necessary; the interpretation of the shift of attitudes which was displayed by Cedar Rapids children of different ages³⁴² would have been incomplete without a record of the intensive nutrition program which had been going on in Cedar Rapids for several years. In such a study the different sub-cultural groups (for Cedar Rapids these were Negro Americans and Czech Americans) have also to be identified and investigated if only to be certain that the results are not being skewed by systematic differences between the food practices and attitudes of these different subcultural groups.

But a study of this sort in which the behavior of school children is placed against a community-wide cultural context is expensive, involves time and personnel, whereas often the student of food habits will be working as an individual with more limited time and resources. In any study of fourth-grade children, in any community, it is necessary to place them against the cultural background and state to what degree that background is known or unknown. So the range of relevant food production should be stated; e.g., "These children come from an area on the edge of a large city. Some come from farms, some from homes where the father works in a factory but maintains a garden. Some live in small, closely packed houses without any gardens and with slight storage space, and all food is bought." If necessary, the statement can stop here with the added comment, "Type of home from which the children come was not included in the study." In this way other students who have taken these factors into account in pursuing similar problems will be able to evaluate and use the results.

Stated abstractly, this means that each topic should be covered in a general way, if not in detail, and the degree to which the group of subjects are homogeneous or heterogeneous in terms of the various classifications should be stated. Every time a statement like "urban children" can be refined by the addition of such limiting descriptive phrases as "city of X, population twenty thousand, drawing on an area of diversified agriculture," "of mixed national backgrounds, mainly Italian and Polish with no Negroes or Mexicans," "chiefly from families who have entered the city to work in two large industries, coming from small subsistence farms in the Appalachian mountains," etc., the investigation becomes that much more valuable. At each step, of course, it should be stated specifically whether the information is drawn from supplementary sources—social surveys, census records, etc.—directly from the subjects themselves, or from interviews with parents of the subjects. After acquiring a preliminary knowledge of the social setting the student will often find ways of holding certain factors constant. One school may be entirely attended by foreign-born children or children whose parents work in a particular industry, and by systematic inclusion of this circumstance

cultural depth can be given to the investigation. There may be an institution from which the children attend the public school, and the known and easily ascertained institutional practices in regard to food in the institution can be used to illuminate the less easily investigated and more diversified home practices.

But in every case it will be found that if the student works through a consideration of the group of subjects in terms of the outline in Part III to determine consciously what he knows, what he does not know, and what he intends to find out, and then states this clearly, the value of any piece of research, both as research and as data on the food habits of a given group at a given period, will be enormously enhanced.

In many types of experiments it will be possible only to describe and control an actual immediate situation, such as eating conditions in a cafeteria, an army canteen, a school lunchroom, and beyond very general statements about age, sex, occupation, and physical status of the subjects, little else will be known in any detail. Here the careful exploration and definition of the immediate situation must take the place of exploration of the wider cultural setting or the culturally patterned life histories of the subjects. In a school lunch situation, for instance, the source of the commodities, the degree to which the menu is controlled by what commodities are available, whether these are surplus commodities or the results of the PTA's canning campaign, whether the lunch is prepared by paid personnel and how those who prepare it feel about it and the children, what the general attitude in the community is toward school lunches, how the children think of lunch at school compared with meals at home—all these immediate situational factors which define the immediate setting can be taken into account instead, while the unknown factors, cultural background of the children's homes, etc., are merely sketched in as unknown or related to very vague generalized social knowledge for that community.

When a series of highly localized situations are taken as the setting for experiments it is necessary to investigate conditions much more closely. For example, if an experiment in acceptance of a new food served in restaurants were made in an old known cultural setting, where the place of restaurants and the role of waiters were so systematic that they could be ascertained by ordinary methods of field work, variations in the behavior of individual waiters might become very unimportant, although a factor to be considered. But in a new, unpatterned situation, as in a recently introduced school lunch program, the personality and behavior of the woman who serves the lunch may be crucial.²⁷⁷ When an experimental situation is being chosen, a consideration of which elements are highly patterned, and so may be allowed for systematically, and which are unpatterned and have to be explored in particular will be an additional guide in the choice of an experimental setup.

When the student wishes to deepen the experimental results, to shift the emphasis, for instance, from what appeals are most influential in inducing the acceptance of a new food or in what form children are most willing to accept a previously disliked food, etc., to the dynamics of this acceptance or rejec-

tion, he will find at once that he needs to shift from his immediate emphasis on immediate behavior to a question of *who* the subjects are in terms of cultural background, differentiated by region, class, nationality, and familial and individual experience. One familiar procedure is to make an experiment ignoring all such factors and then, when intractable results are found, to invoke these factors to explain discrepancies on the order of: "But in School 4 there were many more Italian children who are known to dislike butter on their vegetables and this very likely explains the lower acceptance of the new vegetable in School 4." The systematic exploration of such cultural factors *before* the experiment is made and the careful outlining of those which are excluded should lead to better conceived experiments and more valuable comparative results.

It is granted that the mere accumulation of facts is a technical rather than a scientific task. The same thing can be said of the repetition on a new population of some experiment which has been developed and tried out elsewhere. Both these routine activities, the mere accumulation of more facts of the same order about some new sample and the mere application without change of the same method to a new group, can serve as beginning training ground for students who expect to do advanced work or as part of the technical drudgery of a large-scale survey. But to undertake a problem in this field and *omit to collect the systematic core data* is to make less of a contribution than is possible. Only by combining routine observations and new problems or new methods is it possible for students of every degree of scientific gift to make some contribution to the development of a science, to be sure that the time and labor devoted to a small problem will never be entirely wasted, however poorly some new hypothesis may stand up or some new method turn out.

Investigators can be sure of discharging this obligation by preserving the raw data in some form which is accessible, not necessarily printed but at least in manuscripts deposited in places designated in the published reports. This holds both for the data out of which psychological or sociological abstractions are to be made, when such statements are given as "Nationality, age, and sex were kept constant," and for data out of which nutritional abstractions are formulated, such as "average caloric intake" or "An average intake of vitamin C of x international units was found to characterize the group."

The usual custom is to publish the details of the focus of the experiment and dismiss all of these collateral considerations by formal statements of this sort. When this practice is followed the study is only one link in a chain of investigations in which it will soon be outmoded and superseded, and the raw data collected in order to make the necessary statements about "age held constant" or "average caloric intake" will be lost. If the data on the nationality of the subjects and the detailed diet records which made these two statements possible are preserved and available to subsequent students, our detailed factual knowledge of food habits will be permanently enriched. State university departments of nutrition might well begin depositories of this sort of information, properly indexed and available to other research workers.

If the student stops to consider what a wealth of data lies behind the state-

ments "The arrangement of food in the two cafeterias was found to be identical," "All of the children in the school were found to eat substantially the same breakfast," "The diets also showed a marked riboflavin deficiency," "True and false information tests showed that the children shared very similar ideas of nutrition and attitudes toward nutritional education," "Maternal practice was in accordance with the best current pediatric standards," it will readily be seen what a mass of valuable data is now discarded in the course of making any experiment which involves food habits, records of food intake, attitudes toward change in the field of food, effect of food incentives in learning experiments, discrimination in the field of taste, etc.

2. THE DEVELOPMENT OF FLEXIBLE METHODS

In our preoccupation with standardizing methods, in getting an intelligence test which had been validated on 100,000 school children, we have very often tied our hands. As a portion of the test becomes outmoded, either through a change in education or through an alteration in the cultural content, it becomes less valuable and in the end may have to be done all over again. The validity of the questionnaire on "What did you eat yesterday?" will vary enormously from groups with a low amount of variety to those with a high amount, from groups with a weekly to those with a daily food pattern, etc. If a question of this sort is built firmly into the testing instrument, the instrument becomes rigid and less useful. If we apply our standards of inclusiveness and consistency to the data, and standards of flexibility, new approach, opening up uncharted fields to the *methods* used and problems set, it leaves us much freer to experiment. The student who repeats on Y population an experiment formerly done by Mr. Z with the Q questionnaire on X population can often claim nothing except industriousness.

PART IV

SOME TECHNIQUES WHICH HAVE BEEN USED IN
OBSERVATIONAL STUDIES OF FOOD HABITS



IV. SOME TECHNIQUES WHICH HAVE BEEN USED IN OBSERVATIONAL STUDIES OF FOOD HABITS

Observational studies differ from experimental studies, as at best they do not employ only a few highly standardized techniques, but usually rely on a large number of approaches; observation and recording of group and individual behavior, check and exploratory questionnaires, guided and free interviews (both individual and group), analysis of verbatim material and of visual material, use of traditional materials such as proverbs, rituals, folk tales, advertising format, fiction and poetry, projection methods, etc. Studies which confine themselves to a single technique, such as a questionnaire or a check list, tend to be superficial and are usually justified only in preliminary explorations or large-scale quantitative checkup or amplification of initial intensive work.

It is not the purpose of this section to suggest that any one of the methods briefly referred to here, in its particular relevance to the study of food habits, is more than one in a large kit of methodological tools. Nor is it desired to encourage students, as individual research workers or in groups, to use only one of these methods in a study of food habits except in those cases where they are learning the method rather than pursuing a study in which their primary goal is knowledge of food habits. Nor will this manual attempt to discuss the nature of the interview, the technical problems of questionnaire construction, or methods of group observation. The student should refer to specialists and specialist works on these subjects for instructions and models. However, a few cautions and comments are in order on the use of these methods in studies of food.

Food is concrete. Many subjects of social and psychological research do not include among the phenomena investigated any concrete objects, except of course the individuals studied. But in studies of food, the food itself can be seen, measured, weighed, tasted, etc. Reports by individuals of what they eat can be tested against observations of what they ate, of household consumption against grocery receipts, of buying practices against the stock on their shelves. Claims of allegiance to nutritional principles taught in school can be tested against the choices made in the school lunch situation. Food itself can be prepared in various ways and introduced into social situations, and observations can be made on responses to differently prepared or served food. Any study design should take this concrete aspect into account and allow for it as a cross-check on other types of results.

Direct check on food in homes has been used, including consumption studies,^{410, 665} records of procedures over time,^{25, 184, 410, 422} grocery slips,^{282, 867} measurement of food not eaten.^{25, 181, 516}

Hueneman and Turner²⁹⁵ have compared the accuracy of a diet history—consisting of a report by the subject of the previous day's food intake, his "usual" food intake, frequency of eating certain foods, and distribution of

food among members of the family—with a diet record consisting of a record of food intake for a period of two weeks. They found that no record agreed with the diet history within 20% for all constituents, and recommended that diet studies be made at intervals over a long period of time. The validity of the method of asking children to “record foods eaten yesterday” has been claimed, but the evidence is insufficient.^{29, 605}

Food and food practices of any given group, whether they be the ordinary domestic procedure of the housewife or the trained nutritional approach of the home economics teacher, are complicated. At the beginning of an investigation, students should familiarize themselves with the concrete practices, should not attempt to study food preparation when they do not know the names of cooking utensils or processes, should not compose check lists of food which they know only by name, or test the effect of educational materials using concepts such as “vitamin precursor” which they do not understand. The collaboration in any study of food habits of individuals trained in food and nutrition is highly desirable.

Further, the study of food habits involves the study of a bodily practice about which there are likely to be certain specific types of emotion, shyness, embarrassment, shame, etc. The young child, in the course of learning to conform to the accepted rhythms, patterns, and food choices which constitute the standard nutritional behavior of his social group, has been punished and rewarded, scolded, cajoled, and shamed over the things that he did to his food and the way in which he used his mouth. Many of these early attitudes are likely to color the individual's response both to food and to the interviewer, or color the relationship between those who are eating and a research worker who is watching them eat. The student should be conscious of these difficulties, recognize the extra precautions which will be needed to establish rapport, to dispel any sense that too intimate, too personal questions are being asked, or that the individual's private life is being intruded upon by prying spectators.

In the use of questionnaires, check lists, etc., in which statistical handling of results is contemplated, systematic errors which are correlates of culturally standardized attitudes toward food are likely to occur, such as overestimation of the amount of approved foods eaten and underestimation of the amount of pleasure foods eaten. In a field where there is wide deviation between the educational ideal and actual practice, respondents easily learn to give the approved answers. Some careful work should be done to devise methods of diagnosing these systematic deviations.

Even if students plan to do a very simple study, possibly a guided interview in which a questionnaire or check list is filled out, such as the type of project which Dr. Powdermaker has used with her undergraduate classes at Queens College, Flushing, N. Y.,⁴⁹⁵ or such as can be done by practicing home economists or members of local nutrition committees,³²⁸ it will be desirable for the instructor, the student, or the chairman of the research committee to consider some of the longer studies which have used a variety of these methods in approaching the food patterns of a local area.

The studies conducted by Mary L. de Give and Margaret T. Cussler in

three selected areas of the Southeast—where conferences with trained people professionally concerned with food, interviews with selected informants, and questionnaires were used—are summarized in “Outline of Studies on Food Habits in the Rural Southeast.”¹⁶⁶ Passin and Bennett, with a team of six field workers, made an intensive study of the foodways of a Southern Illinois rural community in which they studied the characteristic and different behavior of several varied sections of the community, the squatters of the riverbottom, the tenant farmer, the Negro residents, the owner farmer, the group who had been on federal relief projects, etc. Several reports of this investigation have been published and it is summarized in “Social Process and Dietary Change.”⁴⁶⁵

The most intensive study of food habits using a combined psychological and anthropological frame of reference was conducted by Kurt Lewin at the State University of Iowa in 1942. Intensive interviewing of a carefully selected set of families was followed by the construction of a projective test,³⁴² in which the reply of the respondent was structured in such a way that much more insight could be obtained into his food attitudes than could be obtained from a questionnaire. This test, a description of which is issued in mimeographed form by the Committee on Food Habits, National Research Council, is suitable for exploring the attitude toward food of any age, sex, or cultural group. It is an exploratory rather than a diagnostic test and so is without norms. Projective tests, in which the subject reacts to material slightly structured so as to turn attention to food, are a useful way of exploring attitudes and can be administered by students with a limited amount of psychological and anthropological training. They do not lend themselves to large-scale machine calculations, as the categories into which machine sorting forces the material obscure the significant nuances.

Hellersberg²⁸³ and Dove²⁰² have both used the check list method to obtain data for delineating pattern rather than as the basis of simple statements about what percentage of persons ate black raspberries or citrus fruits. Hellersberg constructed a check list with a wide variety of foods of relative high and low familiarity, and used the pattern of the responses in terms of frequency of eating as an indicator of rigidity or flexibility of food habits. Dove, interested not in the individual pattern but in the individual as an indicator of regional patterning, also considered the checking of items in a very large list in their relationship to each other, showing, for instance, how individuals with one regional pattern on moving to another region altered and impoverished the material obscure the significant nuances.

Food interviews vary from the simple form of the subjects reporting what they have eaten, or simple exploration of attitudes toward food scarcity, food advertising, food aspirations, through to the combination of the intensive psychiatric interview with the observations of a social worker, used by Dr. Hilde Bruch,⁹³ and to the type of deep psychoanalytic interview which is used as the basis for the studies of gastrointestinal diseases.^{26-8, 417}

One compromise which makes it possible to use a relatively untrained interviewer and yet obtain useful results is the short interview recorded verbatim

in response to a very small number of questions. Such an interview can be conducted by undergraduates who have received introductory training in field methods or by students in other disciplines, and the results analyzed by the method developed by Rhoda Métraux.⁴⁰⁹ This same method can be applied to other types of verbatim material, essays by children or adults, letters, etc. The Métraux method organizes the responses into patterns which reveal cultural consistencies as contrasted with other methods of analyzing verbatim materials which are primarily concerned with statistical interrelationships between different units of content. Methods of analyzing interview material in which the percentage of persons responding say that they eat a certain food or like a certain food are of socio-economic interest in consumption studies but contribute relatively less to our knowledge of the dynamics of food habits.

The interview with the expert or professional, as opposed to the more usual type of field interview with a large number of persons selected according to some sampling plan, has proved exceedingly useful in reconnaissance studies. In this method, the student interviews experts who have a wide knowledge of the food practices of some given group, either autobiographically (as when one would approach the study of Syrian food habits by interviewing a home economist who has been reared within Syrian traditions) or through working professionally with members of the group, e.g., the nutritionist of a social agency dealing with people of some definite national extraction. Dr. Natalie Joffe has used both these methods rewardingly in her background studies of foreign nationality groups.³⁰⁷ Group interviews using controlled discussion among several such experts with experience of the same cultural practices, or among a group of experts with a similar professional background, e.g., public health nurses, nutritionists, home economics teachers, who have worked with different cultural groups, have proved valuable supplementary methods. These methods have been used as backgrounds for more experimental attempts to try out proposed concentrated foods with groups composed of members of a given nationality.³⁰⁸

The specific applications of various methods which have been mentioned here have been discussed so that the interested student planning a piece of research will be able to turn to a study illustrating them, or at least an abbreviated account of the study, such as the series of summaries in "The Problem of Changing Food Habits,"⁶ in which these methods were developed and used in studies of food habits. Many other types of observational approach have never been used in food habits studies but could well be adapted to them.

PART V

EXPERIMENTAL METHODS IN THE FIELD
OF FOOD HABITS



V. EXPERIMENTAL METHODS IN THE FIELD OF FOOD HABITS

Since experimental methods are useful only as they are directed toward specific problems, this chapter will be oriented toward the problems that have been studied experimentally rather than toward methodology *per se*. As in the preceding chapters, emphasis is placed on asking appropriate questions, for a question properly stated can be translated more adequately into experimental terms with more rewarding results. Not all the technical details of the methods used will be described nor all the results mentioned. For these the reader is referred to the original studies.

Most of the experiments discussed in all but the last few sections of this chapter have been conducted on animals, as their living conditions can be controlled to a far greater extent than is possible with human subjects. Such studies can test out on a relatively simple level some of the basic questions regarding food behavior under less complex environmental conditions, and can provide considerable information about animals' behavior toward food and the various conditions influencing their behavior, etc., which will be of great value in understanding the most fruitful direction for human investigation and experimentation.

A. UNDER WHAT CONDITIONS CAN A DIET BE SELECTED WHICH WILL MEET PHYSIOLOGICAL NEEDS ADEQUATELY?

Whether appetite uninfluenced by experience with food could serve as an adequate guide to physiological needs was one of the first questions raised and has received continued attention. The early experiments compared the growth rate and weight gains of animals fed standard diets with those of animals placed in a free choice situation consisting of an array of "natural" foods, many of them foods commonly fed to the animals. Under the latter conditions, pigs²²² and cows⁴⁴³ gained more weight; poultry showed a more efficient and economical use of food⁴⁶⁷ and, despite wide individual differences, showed a fairly constant protein intake²⁵⁶ and an adjustment of cod liver oil intake to the amount of sunlight they received.²⁵⁷ Rats and mice⁴¹⁵ approximated normal growth but were slightly inferior to animals fed a predetermined diet. Rats, offered a free choice of sucrose, caseinogen, and salt, failed to select a sufficient protein proportion to equal the normal growth of littermates fed a mixture of these substances.³²³

Although early studies revealed wide individual differences⁴¹⁵ in the proportions of foods eaten, Dove¹⁹⁵ demonstrated real differences in animals' *ability* to select a diet permitting satisfactory growth. Several thousand chicks were fed a predetermined diet the first three weeks of life. Then he permitted for eight weeks a free selection of seven foods, all of which are ordinarily fed to chicks, and at the end of each two weeks weighed and regrouped the 10

fastest growing and the 10 slowest growing chicks in separate groups. He found marked differences between the abilities of the chicks in the two groups to "choose foods wisely," which he attributes to many factors, termed "nutritive instincts." Dove^{196, 197} shows in later studies that the slowest growing animals are not necessarily inferior in their ability to utilize food. For when the choice made by the "superior" animals, those showing optimum growth and development, is used as the guide to the proper food mixture for the "inferior" animals, the latter show satisfactory growth also, suggesting their inferiority is not due to physiological or organic limitations in the utilization of food, but to inability to select a proper diet.

Richter⁵³⁵ has further developed the self-selection technique by using chemically pure substances. He first experimented systematically to find which kind of oil, carbohydrate, and protein enabled the rat to live longest when it was the sole item of the diet, and then all these pure food substances were made available to the rats at all times—these three substances plus eight solutions of minerals and salts, the three solids in cups, and the eight liquids in bottles. Intake of each food and activity were recorded daily, weight and vaginal smears weekly. Richter⁵³⁵ found that "growth, reproduction, and activity were as good as that of animals fed a standard McCollum diet," and that "œstrous cycles were considerably more regular than when they were on the McCollum diet." He also observed that self-selected diets were more efficient than synthetic diets, particularly in pregnant rats who ingested only about half as much food, but remained in excellent health and produced normal offspring.⁵²⁶ He concluded that animals were able to make satisfactory selections of pure food substances.

Richter⁵²⁵ interprets this observed behavior of the rats in terms of Claude Bernard's principles "of the maintenance of the internal environment," i.e., if the internal balance or homeostasis is disturbed, the organism attempts to return to the balanced state. If this interpretation is correct, one would expect changes in the internal environment to be reflected in changes in appetite. Richter demonstrates this conclusively in a number of studies. Following adrenalectomy,⁵²⁴ which disturbs the sodium balance in the body and permits sodium to be excreted too rapidly, rats decreased dextrose intake and markedly increased intake of water and sodium chloride solution so that they did not manifest the usual symptoms of sodium insufficiency. Such rats, treated with a synthetic compound having the same effect as the hormone of the adrenal cortex, reduced their salt intake to approximately a normal level and increased their dextrose intake.

Clark and Clausen¹²⁸ confirmed Richter's finding of an increased voluntary selection of salt by adrenalectomized animals, but observed no change in intake of other constituents, possibly because they used free selection of pure foods, whereas Richter used a standard diet mixture with sodium chloride and dextrose solutions.

Richter found similar dietary adjustments when the pancreas was removed;⁵³⁸ fat intake increased and carbohydrate intake decreased. After parathyroidectomy⁵³¹ calcium lactate intake increased. In neither case did the

animals show the characteristic symptoms of glandular imbalance. Warkentin, Warkentin, and Ivy⁶²⁴ observed no difference in the appetites of normal, hypo- and hyperthyroid animals except in caloric intake. More than half their rats failed to select a diet promoting growth when equal parts of yeast and salt mixture were combined, but nineteen out of twenty were able to do so when these constituents were separated. This indicates the importance of complete separation of the food constituents into separate containers, if any separation is attempted. Rats deficient in vitamin B complex showed aversion to carbohydrate and protein, and a craving for fat,⁵³⁶ apparently attributable to the separate effects of the B components.⁵²⁸

In an attempt to understand the physiological basis for this remarkable ability of animals to adjust their food intake to meet a physiological imbalance produced by removal of endocrine glands, Richter first determined whether the animals were more sensitive to the solutions containing the substance particularly needed following the removal of glands by testing the salt taste threshold⁵²⁰ of normal and adrenalectomized rats. It was distinctly lower in the latter. However, when the taste nerves were sectioned, the rats' salt intake decreased markedly, suggesting that the changes in threshold are due to "chemical changes in the taste mechanisms of the oral cavity."⁵²¹ *

One way of checking whether the animal's *appetite demand* for a particular solution is located in the taste mechanism alone or in the chemical state of the total body tissues is to use a substance which has only taste properties and cannot be utilized by the body. Such a substance is saccharin which tastes like sugar but has none of the physiological properties of sugar and cannot be assimilated. After determining the normal food and water intake of 12 rats, Hausmann²⁷⁹ found that they decreased their food and water intake proportionately when taking sugar solution in addition to the food and water, but did not show such an adjustment, except in water intake, when a saccharin solution was used in place of the sugar solution. This suggests that taste alone does not regulate consumption. It would be interesting to see if this adjustment would be affected by sectioning the taste nerves, as was done with adrenalectomized rats.⁵²¹ In another study Hausmann²⁷⁸ found that rats on a standard McCollum diet, with water and various concentrations of alcohol or sugar solutions, took the same amount of alcohol, independent of the concentration, and the same absolute amount of sugar, adjusting their food and water intake in both cases.

We are interested in knowing whether human beings in a similar situation are able to adjust their intake of specific foods and apparently automatically "balance" their diets. Richter reports several cases of Addison's disease in human subjects who had an abnormal appetite for salt, with dislike of and near aversion to sweets.^{522, 644} However, there was no opportunity for controlled experimentation with them.

In the classic study of free choice by children, Davis¹⁷¹ studied the choices of three male infants for 6 months, and 12 months in one case, following

* For a discussion of the recent work on the neural mechanism involved in self-selection, see Richter's "Physiological Psychology."⁵²⁵

weaning, from among 33 separate high-grade, well-prepared food items, about 10 to 15 being offered at one meal. The children ate in any manner they wished and a nurse assisted only when they indicated a desire for a particular food by pointing to it. Careful records were kept both of the food consumed and the physical condition of the child. Food choices varied widely from day to day; combinations selected were quite different from those ordinarily offered to children; and often definite preferences would appear from time to time, as a child would eat large quantities of only a few foods for several days. All had excellent growth records, and showed no digestive difficulties or eating problems. One child with rickets at the beginning of the study chose cod liver oil over a period of 101 days, when the rickets were apparently healed, and then ceased to take it.

Although Davis' study leads to the ready conclusion that young children, if left alone, can select a satisfactory diet, it demonstrates this only within the conditions of the study.⁴⁴⁴ Every one of the foods offered was nutritionally desirable, so that the child could not make a nutritionally "poor" choice except by eating a few and omitting others completely. This happened at times, but the child always shifted to other foods. The study does show that, if a child is offered a wide variety of nutritionally desirable foods before he has developed preferences or has been subjected to any of the social pressures accompanying eating, he can regulate his food intake satisfactorily. It does not demonstrate that once children have had other food experiences they can be expected to choose a satisfactory diet, especially when the variety of foods presented is necessarily smaller, and when foods are likely to be presented in combinations rather than separately.

Richter's experiments with animals show much the same thing—that when the animal is provided with a variety of pure food substances it is able to regulate intake sufficiently well to permit excellent growth and health. The work of both Richter and Davis provides the answer to our first question. We may expect human beings to show the same ability as animals in self-selection *only* if the two major conditions of each study are satisfied in actual life situations: 1) that all the foods available for choice are in such simple or pure forms that each contains only one food element, eliminating the problem of overeating one food to get enough of one of its constituent elements; 2) that our eating could remain a simple choice situation without the social influences such as food patterning, use of food for reward and punishment, etc., which inevitably affect the choice of food. Since these conditions are not provided in actual life situations, we need to look further to see under what other conditions animals and human beings are able to select an adequate diet.

A great deal of work is needed on the precise effect of various food experiences on food choices of young children. Very little experimentation has been done,* although a number of studies have been made by observing the reactions of children to food in nursery school situations.^{58, 101, 212, 216, 362, 612, 613}

* See Section J.

B. UNDER WHAT CONDITIONS CAN ANIMALS SELECT THE MORE NUTRITIOUS FOOD MIXTURE FROM TWO OR MORE POSSIBLE CHOICES?

In early studies of the ability of animals to choose the nutritionally superior of two or more *mixed* diets, varying in nutritional adequacy, two mixtures differing only in "type or amount of a single constituent" were offered to rats and mice, who generally ate more of the adequate one and showed fairly normal growth. Rats appeared able to detect small quantities of selenium, a toxic substance occurring naturally in some plants, for when offered a choice of four mixtures differing in selenium content, they consistently chose the least toxic.²³⁵

Harlow²⁷² found that rats preferred the standard McCollum diet to insufficient ones consisting of three kinds of grain, regardless of whether the criterion of preference was the first food eaten or the relative amount consumed. Blind and anosmic rats showed the same preference. Previous diet * appeared to influence their food choices. Rats fed the McCollum diet plus lettuce preferred it to separate food constituents; while rats fed a low protein diet preferred meat scraps to the McCollum diet, which he attributed to "protein hunger."

Although Price⁴⁹⁹ found chicks were able to choose the butter highest in vitamin content, Jukes³¹¹ obtained entirely negative results in a series of studies with chicks, which failed to show a preference between two diets, identical except for the presence in one of vitamin G (lactoflavin), necessary for health and growth. Although accustomed to a diet with a molasses flavor, they did not distinguish between a flavored diet and one unflavored but containing vitamin G.† Chicks with a vitamin G deficiency readily ate a diet mixture containing alfalfa meal, but when offered the basal diet and the alfalfa meal separately, failed to take the latter and many died. In a similar procedure vitamin A deficient chicks did not take enough of the meal to permit normal growth. Jukes suggests that the chicks did not eat the alfalfa meal because of its bitter taste, an explanation also suggested in another study of chicks⁶⁰² to account for their failure to select a diet as adequate as a premixed one. Conflicting results have been obtained with chicks, possibly because in the self-selection studies pure food substances have not been used, but rather foodstuffs ordinarily fed to chicks. It would be helpful to use a self-selection technique similar to Richter's and then observe the effect of the palatability factor, which seems to be important.‡ Such a factor may account for the greater number of refusals of rats to eat a low protein diet adequate in cystine content than a similar diet deficient in cystine.⁴⁹

Wilder,⁶⁴¹ studying the ability of rats to distinguish between a rachitic and an anti-rachitic diet, found that 95% of 22 rats maintained on a normal stock diet showed no consistent preference for either of the two diets, but that in the

* See next section for discussion of this.

† This is contrary to the finding of Harris and co-workers²⁷⁶ that rats learned to prefer a distinctly flavored diet when fed it alone for a period of time.

‡ See Section D for discussion of preferences.

same simple choice situation 68% of the rats maintained on a rachitic diet consistently preferred the anti-rachitic one, while 71% maintained on the anti-rachitic diet consistently selected the rachitic one. He concludes that the choices were not made on a nutritional basis and suggests that the factor of unfamiliarity appears to account for the preferences shown. This finding merits further careful study, particularly in view of other results,* indicating that previous experience with certain food may account for an animal's choice of it from several mixtures. It is also in contrast to the theory of *canalization*⁴³⁶ that familiar objects are more likely to be preferred to unfamiliar ones.

Young and Wittenborn⁶⁷⁸ attempted to limit the problem further by studying the preferences between 1) cottonseed oil and 2) the oil plus viosterol of three groups of rats fed one of three diets: a) rachitogenic, b) rachitic control, and c) adequate. No preference for either oil was shown by any of the three groups, with the exception of one animal, even after the oil containing viosterol had been placed in the cages of rachitic rats for four days. The absence of preference is not attributed to failure to discriminate between the two oils as one rat preferred the oil without viosterol. They suggest that the failure of animals to discriminate in some instances and not in others may be due to the particular vitamin or food element concerned in the discrimination, but it also vitiates the contention that "the appetite of an animal is an infallible guide in the selection of foodstuffs in accordance with metabolic needs."⁶⁷⁸

That vitamin B deficient rats can detect a diet containing the vitamin has been shown by Harris and his co-workers.²⁷⁶ A diet flavored with marmite containing vitamin B was preferred almost exclusively to the same diet without any flavoring or with other flavoring. Similar results were obtained when other sources of the vitamin were used; if vitamin B were provided separately from the food, as in orange juice, the rats would drink it, but then failed to select the food mixture containing the vitamin. Richter⁵³⁴ also observed the immediate preference shown by deficient rats for vitamin B₁ in aqueous solution.

The experimental evidence does not permit an unequivocal answer to Question II. It appears that under some conditions rats can select the more adequate of two or more diets. But what would account for the apparent ease with which rats deficient in vitamin B selected a diet containing vitamin B²⁷⁶ and the complete failure of rachitic rats to select a diet or the oil containing the needed vitamin D (viosterol),⁶⁷⁸ or the failure of chicks to eat alfalfa meal which would have kept them alive?³¹¹ A possible explanation for these differences will be discussed in the next section.

C. WHAT EFFECT DOES PREVIOUS EXPERIENCE HAVE ON THE SELECTION OF FOOD?

Harris and his co-workers observed²⁷⁶ that the rat could not discriminate between a marmite flavored mixture (containing vitamin B) and 5 to 10

* See Section C.

other mixtures, but could be "educated" by simply being offered the marmite mixture alone for several days. During this time the rats recovered considerably and their appetites improved; when offered the choice of the numerous diets again, the one containing marmite was chosen exclusively. When the B concentrate was placed in another mixture, the rats continued to select the one containing the flavor and not the vitamin, thereby showing that the selection was not made on the basis of vitamin B *per se*.

However, Harris reported that they could be "re-educated" at any time to make the correct selection, and attributed the success of the "education" to the "immediate beneficial action of the vitamin B-containing diet," as similar results were not obtained by the same procedure with vitamins A or D, or a protein, none of which produces such immediate improvement in the physical state of the animal. Young and Wittenborn⁶⁷⁸ did not succeed in "educating" rachitic rats to prefer the needed vitamin D, carried in an oil and viosterol mixture. It seems very likely that the same explanation applies here—that the effects of vitamin D ingestion are not as rapid as in the case of vitamin B, and therefore the rats cannot "learn" that this is the beneficial choice. It is important to note that the only source of the successful education was a physiological change; with human beings many other motives are involved in any choice of food, and psychological factors may even obscure physiological ones.

To find out if animals could learn to make a nutritionally *incorrect* selection, Harris and his co-workers²⁷⁶ gave the rats one of the vitamin-free mixtures alone for several days. However, when returned to the choice situation, the rats did not choose this one exclusively and in some cases did not eat as much of it as of the others. This question has rarely been approached experimentally, but is a very interesting problem, and should be explored further for more understanding of the nutritionally undesirable choices made by human beings. The effect of different types of reward on the choice between a nutritionally desirable and a nutritionally undesirable food—of receiving a larger quantity of one than the other, of a competitive eating situation, etc.—might be studied experimentally, weighting the choice in both directions. Such a comparison would indicate some of the conditions under which an animal can learn to select a nutritionally inadequate diet as compared with an adequate one. If it could be demonstrated experimentally in animals, the conditions of such a demonstration would add considerably to our understanding.

Other investigators have found that repetition of a food previously refused by animals will increase its acceptance. Young⁶⁷⁷ successfully "educated" rats to take a vitamin solution in a free choice situation to replace vitamins in the casein and yeast removed from their diet. The animals refused to touch it except when it was the only source of water in their cages and was offered along with Purina cubes. They continued to take it when returned to the self-selection situation. Although Young does not discuss possible reasons in his brief report, it seems very unlikely that the continued choice of the vitamin solution could be attributed to any beneficial effects which the animals felt from it, as they were not deprived of any food element at the time they first learned to take it. Maslow³⁸³ observed that a large proportion of fifteen dogs refused dog meat at first, but after habituation almost as many accepted it.

Sladden^{571, 572} alternated the presentation of two plant leaves, ivy and privet, to stick-insects, first presenting ivy which was frequently refused, and using the privet only if the insect refused the ivy for a certain number of days. The offspring of these parthenogenetic insects who had accepted ivy "rapidly developed an increased ability to accept this plant." She concludes that the "induced food habit," i.e., the acceptance of the ivy, had been transferred from parent to offspring. However, these data may also be interpreted as indicating the existence of an hereditary factor which accounts for the continued acceptance of ivy.

A complete answer to Question C cannot be given at the present time, but it is significant that merely providing an animal with experience in eating a certain food may 1) teach a vitamin B deficient animal to select a distinctively flavored food mixture containing the needed vitamin, or 2) teach animals to accept a vitamin solution they had previously rejected in a choice situation. It is analogous to Lewin's finding³⁴¹ that "people like what they eat rather than eat what they like." Further experimental work is needed to determine if immediate improvement in the physiological state of the organism is the significant factor in a rat's educability, and under what conditions this factor operates. It would also be useful to know if rats could be educated to select a mixture containing vitamin B without any distinctive flavor, or lacking both the flavor and the vitamin. This would tell us whether the animal discriminates on the basis of flavor alone or can detect the vitamin B in the mixture through its physiological effect.

The degree of preference or dislike for particular foods * and their relationship to animals' educability is also an important problem. Jukes³¹¹ suggests they are related and that the chicks did not eat the vitamin-containing alfalfa because of its bitter taste. Young and Wittenborn⁶⁷⁸ considered that possibly rachitic rats failed to discriminate between cottonseed oil and the oil plus viosterol because of the apparently low palatability of any oil to the rachitic rat. Dove found differences in rabbits' preferences for different varieties of legumes, any one of which provided food substances lacking in the mixed diet.²⁰⁰

Another approach to the study of educability is the use of reward and punishment on the preferences shown. This presents a different problem, as we have previously been concerned with the animal's "natural" ability to select a diet and choose between mixed foods, and every attempt has been made to keep the animal relatively "uninfluenced" except for the attempts at "education" by mere repetition of the food. But we need to know more about the type of influences affecting choice of food—how strong and of what nature they must be to change the "natural" choices of the animal. What reinforcements or deterrents would enable an animal to make a nutritionally desirable or a nutritionally undesirable choice? The greater complexity of the attitudes and reactions of human beings to food emphasizes the importance of introducing other factors into experimental work with animals.

* Discussed in the next section.

D. DO ANIMALS EXHIBIT PREFERENCES, AND, IF SO, WHAT ROLE DO THEY PLAY IN THE SELECTION OF FOOD?

Bayer ⁴⁴ studied the food preferences of chickens, mixing five grains each of two cereals and observing which was chosen first. Six hens showed a consistent preference for rice when compared with the other cereals.

Harlow ²⁷² believed that male albino rats showed definite food preferences immediately after weaning, but his evidence is not conclusive as he used one nutritionally adequate mixture and three kinds of grain, none of which was adequate in itself.

Young has studied food preferences extensively, utilizing a runway leading to a platform in the center of which are placed two test-tubes which are filled level to the top with the two foods or liquids to be compared.⁶⁷⁰ In order to eliminate the position factor both test-tubes are alternated in position. The rat may nibble or sniff at both foods, but the one actually eaten is recorded and as soon as a preference is shown (usually in 1-4 seconds) the test-tubes are lowered out of reach. The rat is trained to run back and forth from the starting box to the platform. A food is said to be preferred if selected for six consecutive trials or if it is eaten more often and at the same time the other is not tasted. Young has established the serial principle, also observed by others,^{64, 384} that the *relative* preference for different foods can be expressed as a series with no reversals—if A is preferred to B and B to C, then A is also preferred to C, etc. This indicates the existence of different appetites for separate foods, varying independently.⁶⁷⁵

Young concludes that "preferential habits are definitely acquired; they result from practice."⁶⁷⁷ This is a particularly important point for those interested in the development of food habits. According to Young's criteria, a series of trials is essential before preferences can be shown. In addition, it is to be expected that the rats, having had no experience with either food used in the preference test, would not show preference until they had become familiar with both foods; preference cannot be expressed between two unfamiliar objects. In other words, soon after weaning rats showed preferences for one food to another when the sole experience with either was in the food testing situation, where both were presented equivalently. It is important to note that some rats do not show preferences, regardless of the way in which the apparatus is manipulated in attempting to force a discrimination.⁶⁷³

Young ⁶⁷⁷ recently combined the self-selection method of maintenance with preference testing, using only components of the maintenance diet in preference tests, so that an accurate record of the total daily intake of the group of rats can be obtained. When first placed in the self-selection situation, their intake of sugar, one of the most preferred foods, was very large, but gradually leveled off to a relatively constant intake, as it did with the other foods except for the mineral solutions.

Stone ⁵⁹⁶ describes a method for demonstrating olfactory sensitivity in the rat, placing in the corners of the cage four food-cups, three containing presumably unpalatable flavors. If the rat rejects the three and eats from the other, it is assumed that he can detect the unpleasant flavors. French ²³⁹ de-

scribes a 5- and 2-choice situation, in which the food-cups are covered with a coarse wire mesh permitting the rat to obtain food by use of its paw only. Either method would seem applicable only for the study of discriminating odors which had been demonstrated to be "unpleasant" to rats; otherwise the rat might prefer the odor to the unflavored food.

Dove²⁰⁰ developed a different technique for studying the relative palatability of natural foods by supplying rabbits with a food mixture complete except for the legume, two varieties of which were presented in equal quantity at the same time. Using the relative weight eaten as the criterion of preference, fourteen varieties of legumes and eighteen of cabbage and kale were compared and arranged in rank order of palatability, revealing differences between different classes of legumes as well as subgroupings within each class.

These studies indicate that preferences are shown very soon after weaning by rats whose only experience with the two foods has been when the foods were in equivalent positions. Apparently some explanation other than the animal's experience with food must be used to account for these consistent preferences. Young points to good evidence for at least "ten independently variable partial hungers or appetites." However, this does not account completely for the occurrence of preferences, as animals deprived in one food substance, such as protein, may continue to prefer another (sugar) in the preference test as long as the choice is made by the head receptors.*⁶⁷⁷

E. UNDER WHAT CIRCUMSTANCES CAN PREFERENCES BE CHANGED?

Bierens de Haan⁶⁴ found striking differences between Cebus monkeys and Macacus and Cercopithecus monkeys in their reactions to several variations in preference tests after their relative preferences for seven foods had been determined. The several Cebus monkeys were affected very little by the variations, but the others showed considerable changes when the less preferred food was doubled in quantity. However, further increase in its quantity produced relatively little change, and even a ratio of 10:1 did not change the preference between the most and the least preferred foods. When the more preferred food was placed farther away than the less preferred, little change in preference occurred; when both quantity and distance were changed in favor of the less preferred, great conflict was expressed by the animals and a drop in preference occurred. Covering the preferred food with a transparent or a blackened glass made little difference in preference after the animals had become accustomed to the situation.

Nissen and Elder⁴⁴⁷ also found that the behavior of chimpanzees was readily influenced by changes in the size of their banana reward; when it was increased they were able to stand greater delays and yet respond correctly. That variations of this sort produce real differences in animal behavior indicates the importance of controlling adequately all the conditions of an experimental study.

Young⁶⁷⁷ has used a standard procedure of testing animals' food preferences after 24 hours deprivation. The fact that there appear to be "partial hungers"

* See next section for discussion of this.

or "specific appetites" ⁶⁷⁵ for certain food constituents, however, suggests that satiation with a particular constituent might change the relative preference value of this food as compared with others. Young ⁶⁷⁴ studied systematically the effect of controlled prefeeding on food preferences of a group of 11 rats after their definite preference of sugar to wheat was determined. No change in preference occurred until they were given free access to an unlimited supply of sugar in the prefeeding cage for 15 minutes, followed by a 15-minute preference test, with more opportunity to eat the test-foods, when all showed a clear and unmistakable trend in the direction of preference for wheat, preferring it consistently by the fourth day. When the prefeeding was omitted, the original preference for sugar was gradually restored by the end of five days. Young suggests that if the appetite for sugar had merely been satiated, an immediate reversal might have been expected once the prefeeding was discontinued, but since this did not occur, he thinks the rat was "conditioned to taking wheat." ⁶⁷⁷ Similar shifts in preference have also been demonstrated. ⁶⁷⁴

Young found also ⁶⁷⁷ that rats, placed in a free-eating situation with, for example, both sugar and wheat available, will spend a decreasing proportion of time eating the originally preferred food, sugar, and will eat more and more wheat, until a change occurs and wheat is preferred.

Other experimenters have observed the effect of satiation on food preferences. Bayer ⁴⁴ reports that hens overate when rice, the preferred grain, was given them for a three-day period, and at the end of this time showed less preference for it. When wheat, less preferred in the beginning, was fed in the same way, their preference did not change. Apparently the animal becomes satiated more quickly with the highly preferred food; Young has suggested this also in the comparison of sugar and wheat. ⁶⁷⁴

Hausmann ²⁷⁸ established satiation with alcohol, which the animals avoided for a considerable period of time after it had been the only liquid in their cages.

In testing the food preferences of primates by placing $\frac{1}{4}$ -inch cubes of the two foods to be tested in opposite corners of a black table level with the cage, Maslow ³⁸⁴ observed that the preference seemed to change during a series of 25 choices. Very possibly this was due to satiation.

These studies of shifts in preference when satiation with one food occurs are of considerable theoretical interest as they provide good evidence for the existence of specific appetites; otherwise, satiation with one food would mean satiation of all hungers. They also suggest numerous questions which, if answered, might throw considerable light on the bases for preferences and the interrelationships of partial appetites. Is the reversal in preference due to physiological changes? Can any preference be reversed? Can a permanent reversal be produced? What other conditions in addition to satiation will produce a reversal in preference?

Will a physiological need for the less-preferred food induce a change in preference? Young studied this ⁶⁷⁷ by first establishing rats' preference of sugar to casein, then removing all protein (both casein and yeast) from their diet and continuing the preference tests. Even after 29 days of complete protein deprivation, the rats preferred sugar to casein.

He then developed a method of testing preference which differed from the original one (called the "foods-together" technique), in that the foods were apart, so that the choice-point was not immediately in front of both foods but was back at the starting place. He eliminated sensory cues by placing the food under the level of the bin, and dishes of each test food near the other, but not accessible, so that the same olfactory cues would be present in both places. Using this method, he found that after 29 days of protein deprivation, the rats preferred casein to sugar. This suggests that there are two kinds of preference, one when the "head receptors are forced to function," and one "when the head receptors are eliminated." Young attributes the preference in the foods-together technique, when the choice is made by the head receptors, to what we call the "palatability" of the food and the preference in the foods-apart technique to "some deep-lying organic factor with the head receptors eliminated as factors in the immediate choice."⁶⁷⁷ This extremely important finding opens up a new approach to the whole problem of food choices. What is the nature of preferences shown when the foods-apart technique is used? Are they the same as those shown by the foods-together technique except when the animal has a particular deprivation? Under what conditions does satiation occur and are its effects the same?

F. WHAT EFFECT DOES DEPRIVATION HAVE ON FEEDING BEHAVIOR?

This specific question is related to the general one of the effect of previous experience on eating behavior. Although deprivation in animals is exceedingly different from deprivation in human beings, it is useful to observe in animals some of its simplest effects, uncomplicated by the many influences affecting the behavior of humans. Observation on this level can furnish valuable clues to the investigation of the highly complex phenomena in human beings.

Festinger²²⁶ studied the effect of *relative deprivation* by permitting rats more of one food than another and observing their relative preference for the two foods. Whole wheat grain and dry milk, having very similar preference value according to Young, were used. After 12 hours deprivation rats were given forced runs, and every fourth day free choice between a "ten-second feeding on one food and a one-minute feeding on a different food." Half the experimental group were given the shorter feeding on wheat and the other half on dry milk. At the end of 24 days the animals ran to the food with which they had experienced the longer feeding only slightly more than 50% of the time, while a control group, given similar feeding periods on only one food, ran to the alley where they had had the longer feeding almost 100% of the time. The proportion of runs to the food with the longer feeding period increased steadily as deprivation time was increased to 24 hours, but remained the same when deprivation was increased to 36 hours. Festinger interprets these results "in terms of the one food's becoming more attractive to the animal because of the relative deprivation." It would be useful to see if strong food preferences, for example, sugar to wheat, could be reversed by this method, or if a change in the choice points, the significance of which

Young demonstrated,⁶⁷⁷ might produce different results. Introducing the factor of physiological need for one of the foods plus the variable of the choice point would provide more information about the effects of relative deprivation.

The effects of general deprivation have also been studied. It appears to be the most important factor contributing to hoarding behavior which has only recently been studied experimentally. The criterion of hoarding is the carrying of food from the food box to the home cage, the two separated by an alley approximately 2 to 3 feet in length. Pellets are used, as the animal could not carry loose food, and standard size pellets can be counted easily and provide a quantitative measure. Morgan and his associates⁴²⁵ found that using the criterion of at least 5 pellets carried to the cage was very satisfactory and differentiated the animals who were consistent hoarders and those who were not.

In an exploratory study Wolfe⁶⁵⁵ found that hoarding behavior could be studied quantitatively, as a group of 10 adult rats under constant conditions of hunger showed fairly consistent food-storing behavior during 30-minute periods on consecutive days. Rats fed pellets following weaning hoarded more pellets than rats fed the same food in powdered form, although they were under the same conditions of hunger motivation (24-hour deprivation), showing that experience with food in pellet form contributes to hoarding behavior.

In summary, the general experimental procedure for studying hoarding behavior has been to start immediately at weaning and control the living conditions of all the rats until divided into control and experimental groups. The methods generally used to equate the groups are to split litters or to match individuals or groups in age and weight. McCord³⁶⁴ used preliminary hoarding rate as the basis for equation, but found wide variations among members of the same group, suggesting that this is not entirely satisfactory or a longer period of observation before equation is needed. Some conditions, varied experimentally, and their effect on hoarding are the following:

- 1) Rats fed pellets following weaning hoarded more than rats fed the same food in powdered form, when under the same conditions of hunger motivation.⁶⁵⁵
- 2) Rats fed an inadequate diet immediately or soon after weaning hoarded significantly more pellets than rats fed an adequate diet during this same period. When the diet conditions were reversed and the rats tested immediately afterward, those having experienced deprivation most recently hoarded more pellets, but the difference was not nearly so great as in the first instance.⁶⁵⁵ When rats were tested five months after deprivation, they did not hoard when satiated, but after a subsistence diet for five days the group deprived shortly after weaning hoarded $2\frac{1}{2}$ times as many pellets as the control group, whereas the group deprived at the age of 32 days hoarded slightly fewer than their controls.²⁹⁶

- 3) The group which had experienced the early deprivation ate more food during the first part of the feeding period when placed on the subsistence diet as adults, suggesting that the *rate of eating* may be an important indication of the effect of earlier experience.²⁹⁶ Young⁶⁷³ has developed a technique for recording automatically the rate of eating, including measures of the weight of food eaten per unit of time, and suggests that the "*rate of approach to satiation* is the proper index of an animal's demand for a given food." Because this rate varies according to the "preference-value" of the food, hoarding studies in which pellets of separate food constituents were used should yield some illuminating results.

Kleiber and Smith³²¹ also observed a more rapid rate of eating after a one-day fast among rats whose food intake had previously been restricted than among others who had not been so restricted.

- 4) When the conflict between eating and hoarding (reported by Hunt²⁹⁶) was studied systematically⁴²⁵ by giving animals the first half-hour after 23 hours deprivation for eating only and an opportunity to hoard during the second half-hour, and vice versa for other groups, more hoarding occurred during the second half-hour than the first. When 24-hour deprivation periods (23 hours deprivation and one hour feeding) were alternated with 24-hour satiation, the average number of pellets hoarded was greater on the days when the animals were satiated than when they were hungry.⁴²⁵
- 5) More hoarding occurred after longer periods of deprivation (23 and 36 hours) than shorter (12 hours). Under satiation, the curves of hoarding showed similar drops.⁴²⁵
- 6) No differences in hoarding were observed when the hoarded pellets were removed from the rats' cages at the end of the first third and the second third of the hoarding test.⁴²⁵ However, the rats would not hoard wooden blocks.⁴¹²
- 7) Seeking to evaluate the relative importance of experience and deprivation in producing hoarding behavior, Stellar and Morgan⁵⁸⁶ used two closely matched groups, placing them in the hoarding apparatus daily during the same 18-day period. One was given an unlimited supply of food and the other placed on a 24-hour deprivation schedule. The latter hoarded considerably more, leading to the conclusion that the chief contribution to hoarding "comes from deprivation."
- 8) When two closely matched groups were placed on a 24-hour deprivation schedule the one which had had an opportunity to hoard during the 18-day period hoarded considerably less than the group which had no opportunity to hoard during the same period. Furthermore, the latter group started to hoard at a higher level and hoarded 100% more than the other group, suggesting that the "drive to hoard may be deprived."⁵⁸⁶
- 9) That the familiarity of the animals with the apparatus is an important factor in hoarding behavior is shown by the finding that rats hoarded an

average of 4 times as many pellets to a home cage as to a strange cage which was equally accessible.⁴¹² When rats had become familiar with the alleys by feeding in them for one week, the onset of hoarding behavior was greatly accelerated. The explanation suggested is that the unfamiliar situation produces emotional responses inhibiting hoarding.⁶¹⁵

- 10) Olfactory cues (shavings from home cage placed in strange cage) are more important than visual (fresh shavings placed in home cage) in facilitating hoarding, but do not produce optimal hoarding.⁴¹²

Numerous interpretations have been offered for hoarding behavior, principally 1) on a physiological basis and 2) on a learning basis. Morgan and his associates consider hoarding behavior as primarily "the result of food deprivation," and attribute it to "the creation of some deficit in the body, which requires considerably more food deprivation than does hunger for reaching a crucial level, and takes a greater amount of food intake to relieve than does hunger."⁴²⁵ It may be either an exhaustion of some specific material such as blood sugar or a general lowering of metabolism. To find out whether certain physiological states might account for it, Stellar⁵⁸⁵ studied the effects of injections of glucose, insulin, and epinephrine, but the only significant change resulting was a marked depression in hoarding when epinephrine was used, perhaps from the general depression of activity which it produces. However, he suggests that shortcomings in the experimental procedures may account for the absence of other significant changes.

Wolfe⁶⁵⁵ has suggested that tissue needs are a major determinant in producing hoarding behavior. One might conclude that a diet sufficient to maintain body weight only is actually a more severe deprivation in younger than in older rats, but Hunt²⁹⁶ found no relationship between the degree of inanition during infantile deprivation and the amount of hoarding. Possibly the conflict between eating and hoarding occurred, and the rats more severely affected physically ate more and hoarded less. This could be tested experimentally. Hunt believes that his findings, that rats experiencing feeding-frustration shortly after weaning hoard significantly more than their controls, while rats experiencing similar frustration at the age of 32 days do not hoard more than their controls, provide evidence for the general claims of psychoanalysis that experiences in infancy influence adult behavior. He interprets them in terms of learning theory, that "internal stimuli serve as conditioned stimuli," and that feeding-frustration produces a greater emotional reaction in the younger rats and a consequent greater retention of the effects.

It is also possible that an early experience of deprivation becomes integrated into the physiological pattern, and consequently its effects are retained, whereas a later experience does not have such pronounced effects. Other work has demonstrated the vulnerability of the young mammal to changes disturbing basic biological processes. Ribble's work⁵¹¹ with infants has shown the close relationship of the sucking activity with breathing and muscular relaxation, and the severe reaction occurring in young babies when sucking is frustrated. The neurosis Masserman³⁸⁷ produced in cats by means of an air blast just

as they were ready to eat may also be attributed to the interference with the fundamental process of eating. Further work is needed to show just how early experiences affecting the physiological systems of the young mammal are integrated with the functioning of these systems.

Considerable experimental work must be done to test these various interpretations. One way of determining whether the "psychological effects" may cause hoarding behavior is to keep the actual physical conditions identical. McCord³⁶⁴ has conducted an experiment of this sort; each rat in the "deprived" group was fed one-half a pellet twice a day, while each one in the "frustrated" group received the same amount of food, but was given the whole pellet, and as soon as half was eaten, the other half was placed in a wire receptacle left in the cage, which the animals gnawed at trying to reach the pellet. The "frustrated" rats hoarded more than the "deprived" rats, but there was considerable variation in the groups, possibly because of the method used to equate them.

The study of hoarding is important because it offers an opportunity to study the effect of previous experience on the behavior of rats toward food and a means of measuring this easily in a quantitative fashion. Even when the hoarded pellets are removed, the animals continue to hoard, which suggests that the behavior is not related exclusively to physiological conditions, although it may have been originally, but continues and has no direct relationship to the satisfaction of immediate hunger, since animals hoard more when satiated than when hungry. Its relationship to specific deficiencies has not been explored but is a most interesting question. Also, the relationship between deficiencies and preferences in hoarding behavior remains to be determined.

G. IN WHAT WAY DO SOCIAL AND EMOTIONAL CONDITIONS INFLUENCE BEHAVIOR TOWARD FOOD?

A number of studies indicate the importance of considering in any study of food behavior the social situation in which an animal eats.

In studying the social facilitation of feeding responses of chickens, Bayer⁴⁴ found that a satiated hen ate 25-30% more food in the presence of an actively eating hen, and 33-67% more with three actively eating hens. If three satiated hens were placed with one eating actively, the effect was much less, about 10% more food being eaten. The dominant hen always attacked the other, regardless of whether it was satiated or hungry. Hens eating in groups of four one day and separately the next would eat on the average 96% more food in groups.

Guhl and Allee²⁶⁵ compared the effect on hens of living in a stable flock, in which the peck-order was well established, with that of living in isolation and of living in a constantly reorganized flock, in which no permanent peck-order could be established because of the introduction of strange hens. They found that the isolated hens approximately equalled those in the organized flocks in eating behavior, egg-laying, and weight gains, but that the hens in the disorganized flocks ate less and lost weight. They suggest that "organized flocks of hens possess qualities that might have survival values in nature." This

approach opens up many new problems for study, and shows the importance of taking into account the social situation in which the animal's behavior is studied. What is the relationship of position in the peck-order to Dove's¹⁹⁵ "superior" and "inferior" individuals? Are those who are best able to select a diet permitting optimum growth always highest in the peck-order? Guhl and Allee propose to study the effect of mixed flocks, and suggest comparing the behavior in groups in which the animals have been previously trained to fight and those in which the animals have been trained not to fight. What sort of social organization is evolved by a constant and a frequently changing group under these conditions? What effect does it have on their eating, weight gain, and egg-laying?

In a study of the effect of social facilitation upon behavior in the rat, Harlow²⁷³ found that a satiated rat did not eat more in the presence of a hungry rat. However, rats having no previous experience with solid food regularly ate more in a group feeding situation (2 to 5 rats) than an equated group ate as individuals. And when rats had previously lived and eaten in groups of 4 or 5, much greater facilitation was evidenced in the quantity they ate when fed in pairs on alternate days. Such findings point to the need for further study of social influences, since active excitable behavior is known to inhibit smooth muscle contractions.

Bayroff⁴⁶ studied the effect of early isolation of white rats on their later social behavior, but used as the indicator of their "social behavior" their choice between a compartment containing animals and food and one containing only food, or between one with only the stimulus animals and an empty compartment. In general the preferences appeared to be made on the basis of position of the cages only.

Harlow and Yudin²⁷⁴ fed *Macacus rhesus* monkeys in pairs from the same cup in the same cage, from separate cups in own cages, from separate cups in own cages and one between within reach of both, and from cups located in the adjacent corners of each cage so that each monkey could reach the other's cup as well as its own. In almost all cases facilitation occurred, the degree appearing "as a function of the active competition between the monkeys," that is, the more competition between the two animals, the more each ate. It was more pronounced in the case of a little-liked food, bread, than oranges, which they preferred.

Other studies have been made on the food sharing behavior of chimpanzees. Nissen and Crawford⁴⁴⁶ placed two cages side by side. In one was a food-delivering apparatus which all the animals had learned to use by inserting a poker chip and thereby obtaining a small piece of food. Food and tokens were supplied only to the animal *not* in the same cage with the vender. Tokens were transferred more frequently than food, whereas begging and positive responses occurred more frequently between animals who were close friends.

Nowlis⁴⁵¹ studied the relation of the degree of hunger to the behavior of chimpanzees in pairs in different competitive situations. When both were equally satiated, regularly fed, or underfed, the more dominant took the piece of banana presented through a chute more than half the time. When it was

satiated, however, and the subordinate member underfed, the latter took the piece more than half the time; only one-third of the subordinate members when regularly fed took the piece more than half the time. The results indicate that the "frustration-response" varies "with the strength of the food-drive" in the dominant animal, but "varies slightly with the strength of the food-drive and more importantly with the degree of expectancy or response" in the subordinate animal.

Nowlis⁴⁵⁰ tested preference by placing a chimpanzee in a choice situation in which it could approach either of two other chimpanzees and share peanut kernels. No relationship was found between preference status and food sharing, which occurred only 16% of the time, but there was a relationship between dominance (measured both by food-getting and escaping first from a small cage) and food sharing; the two dominant animals received 73% of the food, and the two subordinate gave 76% of the food shared. The most dominant animal never shared and the most subordinate never succeeded in getting food from its partner.

Mowrer reports⁴²⁹ that adult rats will develop a well-defined ascendancy-submission hierarchy if forced to compete for a 6-gram pellet, that "subordinated rats tend to develop a 'food neurosis,' becoming fearful of eating in the experimental situation even though no other animals are present." Even their problem-solving capacities are likely to be affected.

These experiments show how essential it is to observe every aspect of the situation in which the animal lives and eats. They also indicate the extreme complexity of the eating situation for human beings. Much further work could be done with animals, placing them in different types of living and feeding situations, subjecting them to reward and punishment for certain types of feeding behavior, and observing the effect not only on their feeding behavior but on their social interaction with other animals.

Mowrer studied the development of social behavior in young rats and found that it passed through three stages: non-competitive, competitive, and food sharing. Sharing did not occur if the animal securing the pellet could run into a compartment out of reach of its cagemates, and did not occur in older animals if the same size pellet was used. When sharing behavior was learned, it continued in adulthood, but severe competition occurred if an animal without similar training entered the group. When three rats were put together, after learning individually to press a bar to obtain a pellet, a "social problem" was created, as the animal pressing had less chance to get the pellet. All tend to give up the bar-pressing until very hungry, and then one will "attack the bar, biting and shaking it," producing many pellets, a few of which it gets. A "few repetitions convert the bar-attacker into a confirmed 'worker' and the other two into chronic 'parasites.'" This is an interesting report of the social organization of animals in the food-getting situation. It would be useful to study the relative dominance and submission of the "worker" as compared with the "parasites" and the condition under which this behavior could be modified.

Cannon¹⁰² demonstrated many years ago that emotional reactions inhibit smooth muscle contractions of the stomach which produce the sensation of

hunger as well as of the digestive tract after food ingestion. Studies of the more precise relationship between the two are increasing our understanding of the close relationship of all the bodily functions. Scantlebury and Patterson⁵⁵⁷ recorded the contractions in the empty stomachs of two human subjects by the balloon method and determined the normal rhythm. They then found that the greatest inhibitory effect of various psychic phenomena (not described in detail) on the rhythm occurred during the second two-fifths of the hunger period; if they took place earlier some inhibition occurred, but the total number of usual contractions took place; and if they took place later, the contractions were so near the final tetanic phase that nothing stopped them. In the psychosomatic field Mittelman and Wolff's investigations of the relationship between emotional reactions and stomach secretions, which include the experimental production of lesions through the presentation to the patients of material based on analysis of their life histories, are classic experimental studies.⁴¹⁷

Bousfield⁷⁸ attempted to test the hypothesis that emotionally disturbed animals eat relatively more sugar, since sucrose is relatively easily digested, by placing each experimental animal in the cage of a belligerent animal (determined in a previous study) one-half hour before eating, and then removing it to the home cage where sugar and dog chow were available. He observed a tendency for the experimental animals "to increase their relative sugar consumption after fighting," but the results are not conclusive. The effect of the increased activity before eating should be considered; it would be desirable to place the control group in a situation where they received an equivalent amount of exercise but were not involved in a highly "emotional" situation.

Bousfield's experiment suggests a number of other variations—feeding each experimental animal in the cage where the fighting took place, both immediately after the fighting and during a period of time afterward, to see if eating in the same cage affected behavior toward food. Also, the animal's reaction to 1) a preferred and 2) a relatively unpreferred food in a fighting situation in the same cage and in the home cage might provide information on the effect of the emotional experience of belligerency upon food preferences. Whether a relatively unpreferred food becomes more attractive when eaten by a rival animal is an important question. Harlow and Yudin's study²⁷⁴ indicated that facilitation of eating was a function of competition between the monkeys, and more pronounced with a little-liked food such as bread than a preferred food such as oranges. Is facilitation ever sufficiently strong, however, to change a later reaction to such foods when the subjects are away from the social situation producing it? This is a problem of conditioning on a higher level.

Gantt²⁴⁸ extended a conflict based upon food to other physiological systems by forcing dogs to make "difficult differentiations of signals for food."

Liddell³⁴⁴ discusses the abnormal behavior which can be produced in sheep, dogs, and pigs during conditioning experiments, and emphasizes the importance of considering the relationship between the animal and the experimenter as an essential part of the situation. His conditioning method for the pig involved

a choice between two signals, one indicating food in the box and one for no food, but he attributes the development of an experimental neurosis not to the difficulty of discrimination but to at least two other factors, "the monotonous and 'unsatisfying' repetition of stimuli according to a fixed temporal pattern, and the tensions developed by the animal's self-imposed restraint within the Pavlov frame." However, the animal's behavior toward food became distinctly abnormal, and finally the pig did not open the box to obtain the food until the experimenter entered the room to release it from the apparatus, when the animal rapidly ate the food in the box. Masserman³⁸⁷ produced neurotic behavior in cats by subjecting them to an air blast just as they were ready to eat. Further study of the changes in food behavior resulting from conditioning experience, both when food is a direct part of the conditioning situation and when it is not, should yield valuable results. Does the "neurotic" animal behave abnormally toward food when away from the conditioning situation, when the food is identical with that used in conditioning, or when the experimenter is present?

Experimenters using other types of discrimination have produced experimental neuroses in animals by requiring them to make increasingly difficult discriminations. It would be useful to employ a food choice in similar situations and observe not only the animal's reaction to the experimental situation, but also to its entire life situation.

H. WHAT TYPE OF BEHAVIOR HAS BEEN USED TO STUDY INTENSITY OF HUNGER?

Studies of hunger concern us here because data on food habits can be obtained from studies using hunger as motivation. Does degree of hunger change over a period of time? Does the drive remain at approximately the same level during progressive starvation? Is it periodic? Is its increase at certain times due only to the animal's previous experience in eating at particular times, or is it related to a physiological cycle? Some of these questions have been answered fairly satisfactorily; others require further study.

There is considerable evidence that, although the sensation of hunger in human beings is accompanied by contractions of the stomach,^{102, 289} the hunger or food-getting drive continues in animals whose stomachs have been removed⁶⁰³ and in those whose sensory nerves leading from the stomach to the brain have been sectioned,^{41, 423} as shown by rate of learning with food as the incentive and by obstruction methods. This suggests that hunger relates to a physiological condition not localized in the stomach. Its precise nature is not understood at the present time.

The strength of the hunger drive has been measured by the use of electrical obstructions, obstructions which must be gnawed through, and motor responses, and is assumed to vary in degree as the strength of the obstruction overcome.

Warner⁶²⁵ and Warden and Jackson⁶²³ used electrical obstructions to study the hunger drive in rats during varying periods of food deprivation, while Margolin and Bunch,³⁷⁷ using a similar method, found an inverse relationship

between age and the strength of the hunger drive, which they suggest may be due to changes in the motility of the stomach with age.

Skinner⁵⁶⁹ considers the rate of responding, i.e., pressing a lever to obtain a pellet, a truer indication of "drive" than could be assumed by giving different animals the same amount of food or equal feeding periods. He equated groups according to rate of responding, and validated the method by comparing their extinction curves, which were very similar. Similarly, Heron and Skinner²⁸⁵ studied changes in hunger during starvation by reinforcing the lever response every four minutes with a small pellet of food. The number of responses to the lever per hour increased to a peak after an average of five days starvation, with the range from 4 to 14 days. Fitts,²³¹ in a preliminary report of a study in which the Skinner lever-conditioning apparatus was used, concludes that the "relationship between the degree of hunger, as measured in time since the previous feeding, and number of responses necessary to bring about experimental extinction is not a simple one."

Finan and Taylor²²⁸ found the rate of response, i.e., of pressing a bar to obtain food, was considerably less reliable as a measure of motivation than either the number of responses or the total time required for extinction of this conditioned response. Another approach that permits quantitative study of the hunger drive is the pecking activity of chicks, which, with hunger, increases in energy but decreases in accuracy.⁸¹

Changes also occur in rate of eating. The amount rats ate regularly during a given feeding period decreased with increased deprivation,⁸⁰ probably paralleling physiological changes, as studies have shown the stomach undergoes contraction with decrease in food intake. In view of this, one cannot assume that providing an animal with only a limited feeding period each day, e.g., twenty minutes, will enable it to eat the same quantity of food day after day because, as the animal reaches further degrees of inanition, it eats more slowly.

Bousfield and Elliott,⁸⁰ discussing the methodology of such studies, emphasize the necessity of considering periodicity in the eating rhythm, and suggest establishing a definite eating rhythm prior to the experiment and then observing the behavior of the animal at the time he is normally fed. In other words, it is essential in such studies to establish a norm of behavior against which to measure variability.

Another aspect of this problem is the study of hunger demand for single food elements. The most widely used index is the weight of food eaten per unit of time. Using the apparatus described above,⁵⁶⁹ Skinner determined the curve of approach-to-satiation and the equation for the curve. Young⁶⁷³ obtained similar results, but suggests that "the rate of approach to satiation, rather than the absolute rate of eating, is the proper index of an animal's demand for a given food." This index is the same in principle to the "coefficient of voracity" proposed earlier by Bousfield.⁷⁷ Such an index permits comparison of relative preference value and relative hunger demand for various foods, and observation of changes in each when the animal is satiated with certain foods.

A different technique for studying the relationship between hunger and behavior was developed for use with human subjects by Sanford⁵⁵²⁻³ to investigate the relation of the intensity of a need to the amount of perceptual distortion. He used tests of word association, interpretation of pictures, chained association, completion of drawings, and completion of words—all constructed to elicit possible responses related to food—and found that, although college students who had fasted for 24 hours averaged more food responses than students tested immediately before their normal eating time, the increase of the former group was not in proportion to the increased time of going without food. In fact, the frequency of food responses after 15-20 hours of fasting was smaller than that after either of these other intervals. Sanford interpreted this in terms of a “food habit,” i.e., that the subjects customarily ate at certain times, and that as a result hunger occurred at the time they normally ate, and subsided to a certain extent between these periods. He attributed the occurrence of the greatest number of food responses after the twenty-four hour fast to both the “food habit,” since the test came at noon, and the “physical need for food.”

Levine, Chein, and Murphy³³⁹ did further work on this problem, presenting to subjects, at intervals of one to nine hours after eating, a series of 80 ambiguous figures, half in color and half in black and gray, including 15 pictures of food, 15 of household articles, and 15 meaningless ones. The control group gave relatively constant responses to the pictures, while the experimental group gave more food responses to the achromatic cards after both 3- and 6-hour intervals, but gave less after the 9-hour interval than at any other time. On the colored cards, the decrease in food responses occurred between the 3- and 6-hour intervals. The experimenters suggest that two processes operate, that “the autistic process is in the direction of gratification,” and that “beyond a certain point more ambiguous figures favor the reality process, making it more difficult for the autistic process to proceed.” The results might be interpreted either as indicating that actual hunger decreases between the 6- and 9-hour periods, or that it becomes more intense so that pictures of food are not satisfying and the subject is interested only in real food. The authors believe the second interpretation is the correct one, however, as the number of rejections (refusal to give name to the picture) increased as the length of the hunger period increased.

These studies raise a number of other questions regarding the patterning of hunger in human beings. We know that a definite hunger rhythm can be established in animals.⁸⁰ Does this occur with human beings also? Is hunger experienced at certain times because the individual is generally accustomed to eating at those times? In societies where the customary meal pattern is one meal or two meals a day, does hunger occur after a different interval of time than in groups accustomed to three meals a day? To what extent does the attitude that certain foods are appropriate for certain meals influence what will be eaten to satisfy the hunger; for example, will an individual in our society eat for breakfast foods that are customarily eaten only at one of the other two meals in the day, such as salads, raw and cooked vegetables, etc.?

If he refuses them at first, will he accept them if he has been deprived of several meals? What happens to the appetite for certain foods when an individual has had nothing to eat for varying lengths of time? A study of individual variations in hunger and attitudes coupled with a careful study of the previous training received by these individuals might throw further light on the way food behavior is patterned.

I. WHAT TECHNIQUES HAVE BEEN DEVELOPED TO STUDY THE FOOD AND TASTE PREFERENCES OF HUMAN BEINGS?

In this section we are concerned only with studies directed to the problem of taste sensitivity related to preferences, for although the questions of gustatory sensitivity, its relationship with olfaction and with kinesthetic and temperature sensations and others are of great interest, they are pertinent to the field of food habits only as the sense of taste is related to the attitude or behavior of the subject. Both Platt⁴⁸⁸ and Sweetman⁵⁹⁹ discuss some of the methods of studying palatability and the assumptions on which they are based.

Davis¹⁷² found that infants showed definite taste preferences among four formulas offered in randomized order, and Chaney and McGraw¹¹⁴ observed among neonates distinctly different reactions to various tastes.

Psychophysical methods immediately suggest themselves as applicable to this sort of problem. In a study³³⁰ of changes in taste preference accompanying increase in age, Laird and Breen used the method of least perceptible differences "to establish uniform degrees of separation along the sweetness scale," and finally selected five degrees of sweetness of pineapple juice for comparisons. The preference curve for the youngest group closely paralleled the middle groups; while the oldest groups shifted toward increased preference for tart tastes.

In other studies^{255, 314} no attempt was made to control the way in which the subjects compared the samples of bread, but they were asked to mark them in order of preference and to record reasons wherever possible. Dove²⁰¹ describes a technique in which eight subjects judged the palatability of 18 varieties of sweet corn, comparing six varieties at one sitting, ranking them in order, and recording their reasons for ranking. Then the two which had been ranked first and second in each group were compared, those ranking third and fourth were compared, and so on, so that a hierarchy was built up. Dove suggests choosing certain varieties from the total hierarchy so that any additional variety could be compared with them and given the appropriate rank.

In attempting to select persons with taste discrimination, Moir⁴¹⁸ used varied tests, including a series of sugar solutions to be arranged in order of sweetness, and others devised to see if the subjects were misled by the appearance of the foodstuff. For example, he mixed colors and flavors of table jellies so that the color was not associated with the usual flavor. Similarly, sponge biscuits were chocolate colored, but one was flavored with cocoa and the other with vanilla only. These tests indicated an individual's ability to separate taste from visual characteristics commonly associated with the taste. Tradi-

tionally, the coffee and wine "tasters" are well known and doubtless some of their practices offer valuable clues to research along this line.

It would be helpful to know how keen is the taste discrimination in human subjects, including gustatory and olfactory cues, between disliked or rejected dishes and other dishes resembling these in flavor or consistency, and what sort of discrimination can be made when only kinesthetic cues are present. Blindfold tests in which the subject is given samples of well-prepared food, 1) with no indication as to what they are, 2) when simply told that they are kinds of food which he likes or will accept, and 3) when told what the food actually is, will provide information as to whether rejections of particular kinds are on the basis of taste, texture, or "ideas" associated with the name of the food. The reaction of the subject when told he is to be given a particular kind of food but is actually given another kind, differing in taste, texture, or temperature, would add to our understanding of the factor of "expectancy" in eating. A study of the taste discrimination between dishes of food—some of which contain a constituent which is refused or disliked because of no previous experience with it—and of the relative preferences for the dishes when their constituents are known would indicate the extent to which this knowledge influences the reaction.

J. WHAT TECHNIQUES HAVE BEEN USED TO CHANGE FOOD CHOICES OF HUMAN BEINGS?

Food preferences of animals have been changed by 1) satiating the animal with the preferred food, in which case its preference usually changes,⁶⁷⁴ 2) allowing the animal a consistently shorter feeding period for one food than another, in which case he prefers the one he has had less time to eat,²²⁶ and 3) changing the physiological state of the body by surgical operation or qualitative deprivation, so that the animal prefers the food substance for which he has an increased need,⁵²² and will choose it even in preference to a previously much preferred food if the head receptors are not involved in the choice.⁶⁷⁷

It is fairly common experience to most human beings that satiation with a particular food produces at least a temporary preference for other foods and perhaps dislike for the particular food. However, few studies have been made of the ways in which food preferences of human beings are changed. It is a problem much more difficult to study experimentally, since their lives cannot be controlled to the same degree as the lives of animals, their previous experiences with food cannot be accurately recorded with the techniques we now possess, and although we know that attitudes toward food are inextricably bound up with the manner in which children are taught foodways, we do not yet have comprehensive records tracing the development of these attitudes. In view of the infinitely more complex conditions in which the food habits of people originate and develop, it is fruitless merely to imitate the experimental methods used in studying the behavior of animals toward food. A wholly different approach is indicated in order to obtain results of practical value and not simply abstractions solely applicable to the highly controlled

conditions of the laboratory. The context in which people live must be considered as part of the study and taken into account in interpreting results. If it is desirable to equate groups for a study, it is preferable to do it on the basis of present behavior without assuming a similar past experience in regard to food unless the data documenting psychological or cultural regularities are available to support such an assumption.

Repetition of food has been used to overcome food dislikes. After first determining attitudes of women college students toward evaporated milk, Hollinger and Roberts²⁹² served a small portion of reconstituted milk sixteen times during four weeks; at the end of this time 51%, as compared with 14% at first, indicated a liking for it.

This finding suggests the importance of the factor of availability, which undoubtedly contributes greatly to the development and changes of preferences in human beings. A study like the above could be enlarged to examine the modifications in preference when the foods available are changed. Undoubtedly accepting one new, originally disliked food is different from accepting a number of them at once; a very interesting problem in this connection would be to see whether there is a critical level beyond which none of the strange foods would be accepted. Such a study could conceivably be made with nursery school children as subjects. The importance of motivation for accepting or rejecting foods must be considered. The attitudes of adults and their reactions to an entirely different diet in a strange country may depend greatly upon their general reaction to the new situation, such as the desire to "belong" to the country.

The fact that we generally prefer the familiar to the unfamiliar scarcely needs experimental demonstration but has been shown to apply to food³⁵³ as well as to other objects.³⁸⁶ It is very likely that the mechanism of *canalization*,⁴³⁶ that is, that the objects first providing satisfaction to the individual are persistently preferred to others, even though the later ones might provide greater satisfaction when accepted, operates. Such a mechanism would account for the persistence of preferences for nutritionally undesirable food combinations, for example. A great number of food combinations or single foods can satisfy hunger, and once this satisfaction occurs there is a greater likelihood that the individual will prefer the familiar foods at a later time. This is identical with Lewin's finding that "people like what they eat, rather than eat what they like."³⁴¹

Gauger²⁵⁰ made a detailed study of 17 nursery school children in a standardized situation for 35 days. They were given four distasteful (as judged by the children's reactions) stimuli—vinegar, strong salt solution, weak salt solution, and raw egg white—each followed by a very small piece of milk chocolate. The greatest modifications in their reactions, rated by observers, were in regard to the strong salt solution and vinegar, disliked the most at first. Reactions to all the stimuli, including chocolate, decreased in intensity. Gauger concluded that the important factor in teaching a child to like a disliked food is to keep the situation free from emotional elements. However, considering the importance attached to chocolate in our culture, one can scarcely consider it a "non-emotional" factor.

The effect of social influences on a child's food preferences has been studied by Duncker.²¹¹ Nursery school children were first permitted to choose the food they "liked best" from six different foods, and then each one was given a later opportunity to choose immediately after another child whose choice he observed. There was 81% agreement in choices when one observed the other, compared with 26% agreement when they chose individually. When age was varied systematically, the younger child more readily imitated the older one; however, children under about $2\frac{2}{3}$ years of age did not "follow," and no children imitated an adult.

Marinho³⁷⁹ continued this type of study to see if the imitative effect would last. Using 4- to 6-year-olds in kindergarten, she first tested each child's preference for the fruit pastes used, and then told the child (chosen because of his dominance or ascendance in the group), whose choice was observed, either to select the fruit paste the other child had been avoiding or, if the other child had shown no preference, to select one fruit paste regularly. It appeared easier to set up a definite response in individuals not having a definite preference to begin with, since the children starting out with indefinite preference showed the greatest change, both immediately and later, in tests conducted four to seven weeks and a year afterward. In studying the effect of the personalities of the children chosen to be the "leaders," i.e., make the choices observed by others, Marinho found that, although only a few children observed the choice made by a "domineering" leader, none was appreciably influenced by this leader.

Duncker²¹¹ observed the effect of telling a lively story to a group of young children during which they were given a taste of two solutions; the first tasted very bad according to the story, but actually tasted very good, and the second was supposed to taste very good, but actually tasted very bad. The story-telling lasted about five minutes, but Duncker found a definite after-effect, lasting between 6 to 12 days, revealed in the children's preference for the second solution as compared with the first. He interprets the change as due to a change in *meaning* of the object and possibly to accentuation of favorable elements within it. This is a very important finding, as there seems little doubt that the *meaning* of any food object to a person is an important determinant of the individual's reaction to it, and that if the *meaning* of a disliked food can somehow be changed, it will be accepted. We will return to this point later.

The studies already described dealt with changes in regard to specific food over a limited period of time, often in artificial surroundings. Studies related to more general food consumption, if conducted in homes, would require a tremendous expenditure of time and energy merely to record accurately the foods used and the way they are used over a period of time.²⁵ Their results would be complicated by numerous uncontrollable variations, such as cooking skills of housewives, families' eating customs, etc. One means of avoiding these complications and of utilizing a fairly standard situation is to study food consumption in cafeterias, where every customer has considerable freedom of choice from among the same individual items (except when meals are patterned as "special" lunches, etc.), and where the selections may be easily recorded.

A few essential conditions for a cafeteria study may be stated on the basis of studies already completed: 1) The population of the cafeteria must be fairly static, so that the choices made at one time can be compared with the choices made by the *same* people at a later time. The easiest way to meet this condition is to use a cafeteria serving a particular group of people, such as those working in the same building or in a given factory, and sufficiently isolated from other eating places so that the same people patronize it regularly. 2) Some control must be exercised over the menus in order to provide data which can be interpreted with some degree of validity, for obviously a choice of a meat dish from four meat dishes is very different psychologically from choosing the one meat dish offered. Although one approach would be to keep the menus identical, this may be very difficult unless the observation periods are separated by a considerable lapse of time. Minimum requirements are: 1) that the number of items—of meat dishes, breads, potato dishes, etc.—should be the same throughout the entire study, and 2) if a particular item is being studied, for example, meat dish, the “comparison” dishes, i.e., the other dishes occupying the same place on the menu, should be the same. Other requirements depend upon the specific problem.

There are a considerable number of factors probably influencing food behavior which can be recorded and evaluated during the course of the study. Some which seem of patent significance are weather conditions, the entire menu served each day, and any unusual or other conditions which appear to have any relationship to choice of food.

Three possible experimental designs for cafeteria studies are suggested: 1) a comparison of the consumption of the customers before and after the experimental conditions are introduced, and 2) a comparison of the consumption of customers in separate but identical cafeterias at the same time, introducing experimental conditions in one or more, and keeping one or more as the control, and 3) a combination of the two. If either of the last two is used, an additional condition must be insured, namely, that the population and conditions in each cafeteria are equivalent. Consumption records during an initial “control” period should be kept in order to establish a norm with which subsequent behavior may be compared.

Using the first design, Ready⁵⁰⁵ studied the effect of changing the number of variations in dishes on the breakfast menu of a hospital cafeteria with a fairly static population. When the number of egg dishes and fruit dishes was increased from one each to three each, a significantly greater number were sold. Decreasing the number of choices by one (two fruits and two breads instead of three) had the reverse effect. The findings of this study apply only to menus containing a relatively small variety of dishes, for obviously there is an optimum point beyond which there is no value in increasing the number of dishes. They indicate that the number of variations of a particular food may be an important determinant in the frequency of choice of that food, and reinforce one of the cautions expressed above—that the number of the particular dishes being studied must be kept constant.

The first type of experimental design was also used by Lund³⁵⁴ in a study of food choices made by junior high school pupils in a school cafeteria. The

first four months served as the control period, and the experimental period lasted for six months. The educational materials consisted of 1) talks given in homerooms by student council members on health, etiquette, and civic responsibilities, 2) posters relating to the foods, generally emphasizing health and growth, placed in the cafeterias, halls, and homerooms, 3) commendation slips placed on the trays of pupils choosing "A" lunches, and 4) articles in the school paper. This type of study is limited in two ways; in the first place, weather, available foods, school activities, etc., differ considerably in the fall and spring semesters, and undoubtedly influence food choices made by any group over such a long period of time; secondly, the educational materials were not planned to test the effectiveness of any type of appeal, but were apparently chosen because they were considered effective. The results were not conclusive, but if they had been, all that could be said would be that "with the type of educational materials used," an improvement in the food choices was shown.

The third type of experimental design was used in a study of the relative effectiveness of different combinations of appeals used in presenting a new food—soya.⁶⁶¹ The appeals were based on an analysis of the pattern of verbatim attitudes which showed that soybeans were not yet conceptualized as food, but that certain appeals (nutritional value, American rather than Oriental food, good value for your money, variety) might lead to a favorable conceptualization.⁶⁶⁰ Sets of four posters, carrying different combinations of these appeals, were identical except for the legend, and were placed in each of four identical cafeterias: 1) all four appeals, 2) all except for nutritional value, which was omitted, 3) only nutritional value, and 4) all except "good value for your money," which was omitted. Two other identical cafeterias served as controls. A different soya dish was served on each of five days during the week, all combining soya products with familiar food in a familiar form, in a bread, a meat dish, a meat substitute, a soup, and a dessert. This permitted study of reactions to the *idea* of eating soya products. The name of the dish on the menu included the word "soya" except for the first week when records were kept to indicate the "normal" consumption of each. Records were also kept during the week before the posters were put up, the week the posters were up, and the week after the posters were taken down. The records covered the first two hours of the luncheon period and were kept separately for men and women.

The conclusions are based principally on the statistical significance of changes in consumption in each cafeteria during the week the posters were up. They indicate consistently that the most effective combination was the one in which no mention was made of the nutritional value of soybeans, and that the least effective was the nutrition appeal used alone. This is attributed to the fact that soybeans are an entirely new food, with which customers have no pleasant associations. Because foods which are thought of as "good for us" are considered different from those which are "good to eat," particularly if their taste is unfamiliar, emphasis on the nutritive value of a new food is likely to imply that it is not "good to eat," which in turn would account for

the negative reaction to this appeal. Such a reaction is not as likely to occur, of course, to information about the nutritive value of a food which is already accepted and liked.

A plan similar to that used in cafeteria studies could be used for an experimental study in a community, although there would be many more uncontrolled factors. Young⁶⁶⁷ describes in detail a method for evaluating a community nutrition program by using the sales records of both retail and wholesale grocers, but does not describe the educational campaign.

In any "real life" situation, however, accidental or uncontrolled events are almost unavoidable. Variations in food supplies available at stores, in weather, in the advertising appearing in the stores, etc., are but a few of the many changes which may occur.

A number of attempts have been made to evaluate nutrition education programs experimentally. Gillett and Rice²⁵² conducted two such studies, evaluating the food habits of the families studied on the basis of the cost and quantity of food consumed. In a study of 135 tuberculous families,⁸² the food and health habits of all the children were rated on the basis of information given by the mother both at the beginning of the study and nine months later. The findings indicated an increase in consumption of the protective foods, greatest among the families with whom the nutritionist worked individually, but also among the families the nurses worked with, as compared with little change in the control group. A further evaluation of the specific educational techniques used in studies of this type would be helpful to those interested in nutrition and nutrition education.

Another method of changing food habits is that of *group decision*, developed by Lewin³⁴³ and Bavelas.⁴⁷ Briefly, it consists of a discussion led by a skillful leader in which the members of the group come to regard the matter being discussed as important to themselves and begin to take over responsibility for it, until finally, after some of their objections and statements of difficulties have been aired and discussed, they are ready to reach a decision which is actually a decision made "by the individual concerning her own action."³⁴¹ The effectiveness of this method was compared with that of a lecture method in getting housewives to use glandular meats. In the lecture, the nutritionist talked for approximately half an hour about the nutritional advantages of using the meats, easy methods of preparation, etc.; whereas in the group decision method, the nutritionist participated when questions about preparation were raised and her technical information was needed. Each method was used in one group each at the high, middle, and low income level; the results, obtained a week later by interviewing each of the women, showed a large difference in favor of the group decision method, as 44% of the total women (44) in these groups and only 3% of the 41 women in the lecture groups served one of the glandular meats "they had never or hardly ever served before." It would appear that this method is a successful one even with fairly deep-seated food prejudices, as glandular meats were a highly disliked food.

Willerman⁶⁴⁵ compared the group discussion method with a lecture method in attempting to increase the consumption of whole wheat as compared with

white bread in student cooperative houses. Although his results are inconclusive because the supply of bread was not constant, he found that the reaction to the proposal to participate in the experiment, the students' eagerness to reach their goal, and even their relative preference for whole wheat bread (all rated on scales by the students themselves) depended upon the degree to which the decision was made by a majority. If made only by a very small majority, the group's attitudes were more negative than those of the members of the houses who were asked to try to reach an arbitrary goal, demonstrating that a group decision must actually be a group decision by a considerable majority, particularly where it involves the behavior of all the members at the same time, as it would in a group eating situation.

From the preliminary work done, the group decision method appears to be very worthwhile for further experimental work. Some of the questions that should be investigated are: 1) How long can the effect of the group decision be expected to last? Would it carry over from the group eating situations to choices made by the individuals in other eating situations? Do the housewives continue to use glandular meats? 2) Can decisions be made with different "time perspective," i.e., some which have only immediate carryover value, and others which have more lasting effects? 3) Is there any relationship between the *kind* of change which the group decides to make and the effectiveness of the decision; for example, a change in cooking practice, etc., rather than the use of a new food or the increased use of a familiar food? Are there differences in effectiveness when the change involves behavior which is on a completely individual basis, or concerns one's family or group, or can be observed by the members of the groups making the decision?

K. WHAT EFFECT DOES NUTRITIONAL STATUS HAVE ON LEARNING ABILITY AND PERFORMANCE?

This question is somewhat tangential to the main focus of our attention in this chapter but is of great importance, as good nutrition is considered a means to the goal of good health and efficient performance. Much of the experimental work has been conducted with rats, with maze-learning the chief criterion of learning. In such studies it is extremely important to use an incentive unrelated to the deficiency and it is preferable not to use food at all as an incentive. Aside from the fact that a deficiency in any one dietary constituent may affect the general appetite just as a vitamin B₁ deficiency produces anorexia, is the fact that with normal animals the effectiveness of different foods as incentives varies, probably with their preference-value and also with the relative amount offered.^{64, 226, 262} Since we do not yet know whether or how preferences vary with changes in nutritional status, it would be unwise to use a food which might actually differ in its incentive value to the experimental and control groups. Water (with thirst as the motivation) has been used, but there is probably a complex relationship between thirst and hunger which might vitiate the results. Escape from water appears to be the most useful motivation at the present time, as it is unrelated to the deficiency state and provides continued motivation until the animal leaves the maze.

Rats nursed by mothers fed a diet deficient in vitamin B complex⁵⁹ or in B₁,³⁹¹ and those treated in this way and also fed a vitamin B complex deficient diet after weaning,⁴⁹⁰ were inferior to their controls both in rate of learning the escape from water maze and in retention. Growing rats fed a vitamin B₁ deficient diet showed similar inferiority in learning and retention in an escape from water maze.⁴⁸⁹ Stevens' ⁵⁹⁰ failure to find a consistent inferiority of B₁ deficient animals in maze-learning may possibly be attributed to his use of hunger as motivation. Rats whose diets were not depleted in vitamin B until the age of 90-100 days were significantly inferior to their controls in running time but not in errors, but showed marked individual differences in performance.²⁴¹

Early deficiencies in the B complex or vitamin B₁ appear to produce a more marked deteriorating effect than a later deficiency in vitamin B₁⁶¹ or a deficiency in vitamin B₂,* ^{433, 491} probably because of the relationship of vitamin B₁ to the developing nervous system.⁶⁸¹ There is also evidence that B₁ is involved in the chemical changes occurring with the transmission of the nervous impulse⁴⁴¹ which would account for the sensitivity of the system to B₁ deficiency. Animals deficient in vitamin B₁ acquire significantly fewer conditioned responses (eyelid reflex) than normal littermates;⁶³ the use of conditioning eliminates any possible motivational differences between deficient and normal animals which may occur in studies of learning ability and provides a technique for studying the functioning of the nervous system. Patton, Karn, and King ⁴⁶⁶ found that when equated groups of rats were fed the identical basal diet but given different amounts of vitamin B₁ and tested for susceptibility to convulsive seizures produced by auditory stimulation, there was evidence for a critical level of vitamin B₁ intake falling between the minimum and maximum intake, which resulted in maximum sensitivity.

On the other hand, rats fed a diet deficient in vitamin A, or in iron and phosphorus, did not show inferiority in learning.^{60, 390, 420} Negative results were obtained when rats were fed a "native Mexican diet,"⁶³⁰ or a rickets-producing diet.²³⁴ McCarrison ³⁵⁷ demonstrated the superiority of the Sikhs' diet over a diet "resembling that eaten by many Western people of the poorer classes" by feeding both to equated groups of rats and observing the growth effect.

Although a number of studies purport to show that rats whose growth was stunted by early feeding deficiencies^{32, 322, 550} were superior to their control groups in maze-learning, it seems very possible that the difference in maze-learning was due to a motivational difference (greater hunger) rather than to a real difference in ability. Biel ⁶² tested this possibility by depriving control animals with previously normal growth so that their weight was reduced

* It is important to remember that in the experiments completed before the isolation of niacin (1938) and pantothenic acid (1938) the term B₂ may refer to a substance including not only riboflavin, which is synonymous with the term B₂ at the present time, but other components of the B complex. Since the physiology and biochemistry of nutrition is a field of specialization quite apart from experimental psychology, it is necessary to call upon specialists within it for assistance in any study including a nutritional problem.

as much as possible and yet permitted their running the maze. Comparison showed their performance was approximately the same as that of stunted animals, suggesting that degree of hunger is an extremely important factor in maze-learning when food is the motivation. It would be preferable to utilize a source of motivation unrelated to hunger and appetite in studies of the effect of stunting on learning.

Further understanding of the basis for changes in behavior produced by a deficient diet has been obtained by studies of the effect of vitamin deficiencies on the structure of the developing nervous system. When rats were fed a diet deficient in vitamin A, they developed lesions in the nervous system after 10 to 12 weeks of normal growth; ^{653, 682} these lesions are apparently due to mechanical causes, that is, stunting of the braincase caused overcrowding and produced lesions in the nervous system. An overgrowth of bone and degeneration of the eighth cranial nerve has also been reported in young dogs deficient in vitamin A.⁴⁰⁷ Lesions of the nervous system have been experimentally produced in pigeons, rats, and dogs fed a diet deficient in vitamin B₁.⁶⁸¹ Rats fed a diet free from vitamin E from the time of weaning showed psychomotor disturbances accompanied by neurological and muscular changes at the age of ten months.⁴¹⁹

Studies of the effect of vitamin deficiencies and vitamin feeding on human behavior have used principally two criteria of changed behavior, 1) change in mental performance and 2) change in work output. Summarizing earlier studies of change in mental performance, Fritz ²⁴³ concludes that none of the studies with children as subjects indicates that diet markedly affects intelligence. He points out, however, that the relatively short sampling periods of behavior, such as an intelligence test, may not reveal differences in capacity. It also appears possible that the relatively short length of time during which the improved diet has been eaten may not permit clear changes to appear. Balken and Maurer ³⁸ reported that young children showed an increased efficiency of performance on mental tests when their diet, previously deficient in the vitamin B complex, was supplemented by it. Harrell ²⁷⁵ fed tablets to all the children in an orphanage; half received tablets containing thiamin and the other half received placebos. She found that the group receiving the thiamin showed an improved performance in code learning, reading, and arithmetic.

Adult schizophrenics, given vitamin supplementation (A, D, B₁, B₂) and iron, showed a significantly greater improvement on the Arthur Performance Scale, administered three times at intervals of six months, than a carefully matched control group.³⁹ Four middle-aged women, given a diet deficient in the B vitamins, showed an inferior performance on maze tests, but no difference on tests of general intelligence, reasoning ability, or hard-muscle coordination.⁴⁶¹ The effect of vitamin administration on the symptom picture of adult psychotics ²⁷⁰ and of children with nervous diseases ³²⁰ has also been studied. Such studies, however, would be of greater value if a dietary history, complete record of dietary intake during the course of the study, and examination of nutritional status had been included. Obtaining adequate records of this sort is one of the problems involved in experimentation with human subjects.

Within the last few years a number of studies of the effect of vitamin intake and deficiencies upon the work output of adult men have been made in which more complete records of dietary intake and nutritional status have been kept.*

The rigidly controlled experimental situation which Keys and his co-workers³¹⁸ have developed provides an unusual opportunity for study of the influence of reduced vitamin and food intake on both motor and mental performance as well as on various personality traits of young men. Much of the data is still unpublished, but when available will provide valuable information concerning the effect of vitamin deficiencies on mental performance.

* See summary discussions^{188, 616-8} for appraisal of these.



PART VI

HOW TO FIND REFERENCES IN THE FIELD OF FOOD HABITS

VI. HOW TO FIND REFERENCES IN THE FIELD OF FOOD HABITS *

Since food habits may not be a separate category in many library catalogues and, even if it is, may not include many of the references in which the individual doing research is interested, the following list of headings is suggested for source material: diet, dietetics, nutrition, food, cookery, agricultural economics, agricultural statistics, public health, consumer demand, consumer education, child training, eating, etc. Since different schemes of cross-references are used, it is safer not to depend upon them but to check all the possible sources. The following indexes have proved useful:

Nutrition Abstracts and Reviews. Published since 1931. Detailed abstracts and comprehensive indexing of each volume. For regional dietary studies look under the heading "Diet" for the particular region of the world.

Experiment Station Record. Published since 1889. Detailed abstracts of experiment station and U.S.D.A. publications, and of research related to food and nutrition reported in other publications. Best source for food consumption studies conducted in this country.

Psychological Abstracts. Published since 1927. Abstracts of articles appearing in psychological journals principally; good source for experimental work conducted in psychological field. Look under the headings: appetite, food, hunger.

Agricultural Index. Published since 1916. Indexes to most of the agricultural journals published in this country and to many published elsewhere.

Quarterly Cumulative Index Medicus. Published since 1927. Comprehensive index to most medical journals, including many published in other countries.

International Index to Periodicals. Published since 1907. (Readers' Guide Supplement until 1920.) Index to many of the journals in fields of anthropology, sociology, psychology, political science, history, etc.

Readers' Guide to Periodical Literature. Published since 1919. Primarily an index to popular periodicals.

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PART VII

BIBLIOGRAPHY

This selected bibliography has been compiled to provide orientation in the problems of food habits and the methods and techniques used to study them. Within the United States, we have listed studies because they contain concrete data, whether or not they are of special theoretical or methodological interest. Outside the United States, we have attempted to select classical studies, such as the report of the League of Nations, and a few articles that have a theoretical or methodological interest or which might serve to stimulate cultural awareness in American students.

ORIENTATION BIBLIOGRAPHY

1. American Academy of Political and Social Science Annals. Nutrition and food supply: the war and after. 225: 1-279, 1943.
2. American Medical Association, Council on Foods and Nutrition. Handbook of nutrition, a symposium. Chicago, A.M.A., 1943. 586 p.
3. American School Health Association. Special nutrition number. J. School Health, March 1944. 82 p.
4. Bigwood, E. J. Guiding principles for studies on the nutrition of populations. Geneva, League of Nations, Health Organization, Technical Committee on Nutrition, vol. 3, no. 1, 1939. 281 p.
5. Black, John D. Food enough. Lancaster, Pa., Jacques Cattell, 1943. 269 p.
6. Committee on Food Habits, National Research Council. The problem of changing food habits. NRC Bull. 108. Washington, D. C., 1943. 177 p.
7. Food and Nutrition Board, National Research Council. Inadequate diets and nutritional deficiencies in the United States. NRC Bull. 109. Washington, D. C., 1943. 56 p.
8. Food and Nutrition Board. Recommended dietary allowances. NRC Reprint and Circular Series, no. 115, 1943. 6 p.
9. League of Nations. Problem of nutrition. Geneva, 1936. 4 vols.:
 - I. Interim report of the mixed committee on the problem of nutrition. 98 p.
 - II. Report on the physiological bases of nutrition. 27 p.
 - III. Nutrition in various countries. 271 p.
 - IV. Statistics of food production, consumption, and prices. 110 p.
10. League of Nations. Final report of the mixed committee of the League of Nations on the relation of nutrition to health, agriculture and economic policy. Geneva, 1937. 327 p.
11. League of Nations Health Organization. Intergovernmental conference of Far Eastern countries on rural hygiene. Preparatory papers:
 - Report by the preparatory committee. Geneva, 1937, p. 55-74.
 - Note on public health organization in Burma. Note on public medical organization in Burma. March 1937, p. 23-27.
 - Report of French Indo-China. March 1937, p. 74-101.
 - Preparatory papers relating to British India. Geneva, April 1937, p. 45-69.
 - Report of the Malayan delegation. May 1937, p. 23-27.
 - Report on health organization in Ceylon. April 1937, p. 40-49.
 - Report of the Philippines. April 1937, p. 16-25.
 - Report of China. May 1937, p. 50-62.
 - Report of Japan. May 1937, p. 25-29.
 - Report of Siam. May 1937, p. 36-44.
 - Reports of Hong Kong, North Borneo, Sarawak, Fiji, Gilbert and Ellice Islands Colony, British Solomon Islands Protectorate, New Hebrides Condominium, Tonga. May 1937, pp. 22-24, 32-35, 49, 70-76, 88-89, 109-112, 120-122.
 - Report of the Netherlands Indies. June 1937, p. 118-144.
 - Report of intergovernmental conference of Far Eastern countries on rural hygiene. September 1937. 119 p.
12. League of Nations. Report on the work of a group of experts appointed to study methods of assessing the state of nutrition in infants and adolescents. A. Introduction. B. Recommendations made by the experts. C. Bigwood, E. J. The methods of assessing the state of nutrition in infants and adolescents in relation to defective diet. Geneva, Bull. of the Health Org., 6: 129-136, 137-140, 141-204, 1937.
13. League of Nations. Secretariat. Survey of national nutrition policies, 1937-38. Geneva, 1938.

14. League of Nations, Health Committee. European conference on rural life. General technical documentation. Rural dietaries in Europe. Geneva, 1939. 84 p.
15. McCollum, E. V., Orent-Keiles, E., and Day, H. G. The newer knowledge of nutrition. New York, Macmillan, 1939. 701 p.
16. MacLeod, G., and Taylor, C. M. Rose's foundations of nutrition. 4th ed. New York, Macmillan, 1944. 594 p.
17. Nutrition Advisory Committee to the Coordinator of Health, Welfare, and Related Defense Activities. Minutes of the national nutrition conference for defense, May 1941. Govt. Print. Off. 253 p.
18. Orr, J. B. Food and the people. London, The Pilot Press Ltd., 1943. 56 p.
19. Reid, M. G. Food for people. New York, John Wiley & Sons, 1943. 653 p.
20. Sherman, H. C. Chemistry of food and nutrition. 6th ed. New York, Macmillan, 1941. 512 p.
21. Sherman, H. C. The science of nutrition. New York, Columbia Univ. Press, 1943. 253 p.
22. Sherman, H. C., and Lanford, C. S. Essentials of nutrition. 2nd ed. New York, Macmillan, 1943. 442 p.
23. United Nations Conference on Food and Agriculture, Hot Springs, Virginia. May 18-June 3, 1943. Final act and section reports. Pub. 1948, Conf. Series 52. Govt. Print. Off., 1943. 61 p.
24. United States Department of Agriculture. Food and life. Yearbook of agriculture, 1939. Govt. Print. Off. 1165 p.

BIBLIOGRAPHY *

A

25. Abrams, M. L. Special social surveys in Great Britain. Conf. of Comm. on Food Habits, Nat. Res. Council. *In* The problem of changing food habits, p. 170-171. See No. 6. ✓
26. Adlersberg, D., and Houser, T. Special diets under rationing. *J. Am. Dietetic Assoc.*, 19: 576-577, 1943.
27. Alexander, F. General principles, objectives and preliminary results. *In* The influence of psychologic factors upon gastro-intestinal disturbances: a symposium: a report upon research carried on at the Chicago Institute for Psychoanalysis. *Psychoanalytic Quart.*, 3: 501-588, 1934.
28. Alexander, F. Emotional factors in essential hypertension. *Psychosom. Med.*, 1: 173-179, 1939.
29. Alexander, F. Psychoanalytic study of a case of essential hypertension. *Psychosom. Med.*, 1: 139-152, 1939.
30. American Child Health Association. A health survey of 86 cities. New York, 1925. 158 p.
31. American Dietetic Association. Selected list of references on national food patterns and recipes. June 1944. 21 p.
32. Anderson, J. E., and Smith, A. H. Relation of performance to age and nutritive condition in the white rat. *J. Comp. Psych.*, 13: 409-446, 1932.
33. Angyal, A. Disgust and related aversions. *J. Abn. and Soc. Psych.*, 36: 393-412, 1941.
34. Ashton, E. H. A sociological sketch of Sotho diet. School of Africa Studies, Univ. of Capetown. *Tr. Royal Soc. So. Africa*, 27: 147-214, 1939.
35. Atwater, W. O., and Woods, C. D. Dietary studies with reference to food of the Negro in Alabama in 1895 and 1896. U. S. Dept. of Agr., Off. of Exp. Sta., Bull. 38, 1897.

B

36. Bailey, F. L. Navaho foods and cooking methods. *Am. Anthropol.*, 42: 270-290, 1940.
37. Bakwin, H. Malnutrition and mental disease in children. *Nervous Child*, 3: 160-161, 1944.
38. Balken, E. R., and Maurer, S. Variations in psychological measurements associated with increased vitamin B complex feeding in young children. *J. Exp. Psych.*, 17: 85-92, 1934.
39. Balken, E. R., Maurer, S., and Falstein, E. I. Variations in psychological measurements associated with increased feeding of vitamins A, D, B₁ and B₂ with iron in dementia præcox. *J. Comp. Psych.*, 21: 387-403, 1936.
40. Bash, K. W. Contribution to a theory of the hunger drive. *J. Comp. Psych.*, 28: 137-160, 1939.
41. Bash, K. W. Possible organic basis for hunger drive. *J. Comp. Psych.*, 28: 109-135, 1939.
42. Bateson, G. The frustration-aggression hypothesis and culture. *Psych. Rev.*, 48: 350-355, 1941.
43. Bateson, G. Social planning and the concept of "deutero-learning." *In* Science, Philosophy, and Religion, Second Symp. New York, Conf. on Sci., Phil., and Rel., p. 81-97, 1942.
44. Bayer, E. Beitrage zur Zweikomponenten-theorie des Hungers. *Zsch. f. Psych.*, 112: 1-53, 1929.
45. Bayer, L. M. The diet of adolescent girls, with special reference to nutritional status and dental caries. *J. Pediat.*, 16: 56-68, 1940.

* Part of this bibliography was prepared initially for the Committee on Food Habits by Herbert Passin.

46. Bayroff, A. G. The experimental social behavior of animals. I. The effect of early isolation of white rats on their later reactions to other white rats as measured by two periods of free choices. *J. Comp. Psych.*, 21: 67-81, 1936.
47. Bavelas, A. Group decision: paper read before a meeting of the S.P.S.S.I., 1943.
48. Bazore, K. Hawaiian and Pacific foods. New York, M. Barrows & Co., 1940. 286 p.
49. Beadles, J. R., Braman, W. W., and Mitchell, H. H. The cystine deficiency of the proteins of garden peas and of potatoes. *J. Biol. Chem.*, 88: 615-622, 1930.
50. Beals, R. L., and Hatcher, E. Diet of a Tarascan village. *América Indígena*, 3: 295-304, 1943.
51. Bejarano, J. Alimentación y nutrición en Colombia. 2a ed. Bogota, Editorial Cromos, 1940. 170 p.
52. Benedict, F. G., Miles, W. R., Roth, P., and Smith, H. M. Human vitality and efficiency under prolonged restricted diet. *Carnegie Inst., Wash. Pub.* 280, 1919.
53. Benedict, F. G., and Steggerda, M. The food of the present-day Maya Indians of Yucatan. *Carnegie Inst., Wash. Pub.* 456, p. 155-188, 1937.
54. Benet, S. M., and Joffe, N. F. Some Central European food patterns and their relationship to wartime problems of food and nutrition. Polish food patterns. Comm. on Food Habits, Nat. Res. Council. February 1943. 14 p. Mimeographed.
55. Bennett, J. W., Passin, H., and Smith, H. Food and culture in Southern Illinois: a preliminary report. *Am. Soc. Rev.*, 7: 645-660, 1942.
56. Bennett, J. W. Food and social status in a rural society. *Am. Soc. Rev.*, 8: 561-569, 1943.
57. Bennett, J. W. Some problems of status and solidarity in a rural society. *Rural Soc.*, 8: 396-408, 1943.
See also Nos. 464, 465.

J. W. Bennett made an extensive anthropological study of food habits and the process of cultural change in Southern Illinois. See "The Problem of Changing Food Habits" ⁶ for summary of work.

58. Berkman, C. Mother-child relationships in cases involving difficulties in eating. *Smith Coll. Stud. Soc. Work.* 10: 105-106, 1939.
59. Bernhardt, K. S. The effect of vitamin B deficiency during nursing on subsequent learning in the rat. *J. Comp. Psych.*, 17: 123-148, 1934.
60. Bernhardt, K. S. (1) Protein deficiency and learning in rats. (2) Phosphorus and iron deficiencies and learning in the rat. (3) Vitamin A deficiency and learning in the rat. *J. Comp. Psych.*, 22: 269-278, 1936.
61. Bernhardt, K. S., and Herbert, R. A further study of vitamin B deficiency and learning with rats. *J. Comp. Psych.*, 24: 263-267, 1937.
62. Biel, W. C. The effect of early inanition upon maze learning in the albino rat. *Comp. Psych. Monogr.*, vol. 15, no. 2, 1938. 33 p.
63. Biel, W. C., and Wickens, D. D. The effects of vitamin B₁ deficiency on the conditioning of eyelid responses in the rat. *J. Comp. Psych.*, 32: 329-340, 1941.
64. Bierens de Haan, J. A., and Heubel, F. Über Futtevorliebe bei Affen und die Bestimmung ihrer Grösse und Stärke. (Food preference in apes and the determination of its extent and strength.) *Z. Morph. Ökol. Tiere*, 34: 89-120, 1939.
65. Binger, C. A. A word to teachers about eating habits. *Understanding the Child*, 11: 3-6, 1942.
66. Blackstone, J. H., and Inman, B. T. Food habits of consumer groups in small towns of Alabama that affect farmers' markets. *Ala. Agr. Exp. Sta. Bull.* 252, 1942. 68 p.
67. Blanchard, M. A. School progress of well-nourished and undernourished children. *J. Home Econ.*, 16: 645-646, 1924.
68. Blatz, W. E. A study of eating habits in a nursery school. In Bott, E. A., Blatz, W. E., Chant, N., and Bott, H. Observation and training of the fundamental habits in young children. *Genet. Psych. Monogr.*, 4: 89-115, 1923.

69. Boalt, C., and Zotterman, Y. Rations and food consumption in Sweden during 1942-43. *Nature*, 152:635-636, 1943.
70. Boas, F. Ethnology of the Kwakiutl. 35th Rept. of the Bur. of Am. Ethnology, p. 305-601, 1913-1914.
71. Boggs, E. G. Nutrition of 50 colored families in Chicago. Univ. of Chicago, 1929. M. A. thesis.
72. Bonser, H. J., and Tontz, R. L. Food consumption by farm families near Douglas Reservoir. Tenn. Agr. Exp. Sta., Agr. Econ. and Rural Sociol. Dept. Monogr. 160, 1943. 44 p.
73. Boots, J. L. A preliminary study of the diet and customs of the Korean people with relation to their oral conditions. Korea, J. Severance Union Med. Coll., 3: 35-62, 1935.
74. Borsook, H., Alpert, E., and Keighley, G. L. Nutritional status of aircraft workers in Southern California. *Milbank Mem. Fund Quart.*, 21:115-157, 1943.
75. Borsook, H., and Halverson, W. L. Nutrition and health in Pasadena. *Am. J. Pub. Health*, 30:895-900, 1940.
76. Bousfield, W. A. Certain quantitative aspects of chickens' behavior towards food. *Am. J. Psych.*, 46:456-458, 1934.
77. Bousfield, W. A. Quantitative indices of the effects of fasting on eating-behavior. *J. Genet. Psych.*, 46:476-479, 1935.
78. Bousfield, W. A. A study of experimentally induced shifts in food-preference. *J. Genet. Psych.*, 61:69-80, 1942.
79. Bousfield, W. A., and Elliott, M. H. The effect of fasting on the eating behavior of rats. *J. Genet. Psych.*, 45:227-237, 1934.
80. Bousfield, W. A., and Elliott, M. H. The experimental control of the hunger drive. *J. Gen. Psych.*, 15:327-334, 1936.
81. Bousfield, W. A., and Spear, E. Influence of hunger on the pecking responses of chickens. *Am. J. Psych.*, 47:482-484, 1935.
82. Bovee, D. L., and Downes, J. The influence of nutritional education in families of the Mulberry area of New York City. *Milbank Mem. Fund Quart.*, 19: 121-146, 1941.
83. Boyd, G. R. The construction of an instrument for measuring attitudes toward desirable food practices. *Coll. of Educ., Univ. of Kentucky, Bull. of Bur. of School Service*, 16:7-85, 1943.
84. Britton, V. Food consumption of 538 farm and 299 village families in Vermont. *Vt. Agr. Exp. Sta. Bull.* 474, 1941. 46 p.
85. Brockington, F. Further observations upon the influence of the growing family upon the diet in rural districts in Sussex. *J. Hyg.*, 38:547-557, 1938.
86. Brown, A. P. Food habits of Utah farm families. *Utah Agr. Exp. Sta. Bull.* 213, 1929. 20 p.
87. Brown, A. P. Diet as an index to living level in some Utah farm homes. *Utah Acad. Sci. Proc.*, 8:111-114, 1930-1931.
88. Brown, A. P. Food habits of rural school children in relation to their physical well-being. *Utah Agr. Exp. Sta. Bull.* 246, 1943. 52 p.
89. Browne, T. J. Nutrition and scholarship. *N. Y. City Bull. of High Points*, 10:11-13, 1928.
90. Bruch, H. Dietary treatment of obesity in childhood. *J. Am. Dietetic Assoc.*, 20:361-364, 1944.
91. Bruch, H. Food and emotional security. *Nervous Child*, 3:165-173, 1944.
92. Bruch, H., and Janis, M. Adjustment to dietary changes in various somatic disorders. *In The problem of changing food habits*, p. 66-73. *See No. 6.*
93. Bruch, H., and Touraine, G. Obesity in childhood. V. The family frame in obese children. *Psychosom. Med.*, 2:141-206, 1940.

H. Bruch has studied the psychosomatic aspects of food habits in reference to obesity in childhood.

94. Brues, C. T. Aberrant feeding behavior among insects and its bearing on the development of specialized food habits. *Quart. Rev. Biol.*, 11:305-319, 1936.
95. Brush, A. L. Recent literature relative to the psychiatric aspects of gastrointestinal disorders. *Psychosom. Med.*, 1:423-428, 1939.
96. Bryson, B. E., Tucker, C., and Davis, H. J. A study of the diets of home demonstration club members' families in twenty-seven parishes of Louisiana. *La. Agr. Exp. Sta. Bull.* 356, 1942. 23 p.
97. Buck, P. H. Samoan material culture. Hawaii, Bernice P. Bishop Mus., 1930. 724 p.
98. Bunzel, R. The role of alcoholism in two Central American cultures. *Psychiatry*, 3:361-387, 1940.
99. Burdette, R. F., and Walker, W. P. Where Frederick and Salisbury, Md. get their food supplies. *Md. Agr. Exp. Sta. Bull. A 11*, p. 313-331, 1942.
100. Byrd, H. M. Ways of living in 100 families in Harlem in 1932. New York, Teachers Coll., 1934. Unpublished M. A. thesis.

C

101. Campbell, E. H. The effect of nursery school training upon the later food habits of the child. *Child Developm.*, 4:329-345, 1933.
102. Cannon, W. B. Hunger and thirst. In Murchison, C. A handbook of general experimental psychology. Worcester, Clark Univ. Press, 1934. Chap. 5.
103. Carr, L. G. Survival foods of the American aborigines. *J. Am. Dietetic Assoc.*, 19:845-847, 1943.
104. Cassel, B. Jewish dietary laws and food customs. *Pub. Health Nursing*, 32:682-687, 1940.
105. Castellanos, F. E. Valor diético de un menu típico cubano. *Rev. Méd.-quirúrg. de Oriente*, 4:12-16, 1943.
106. Castetter, E. F. Uncultivated native plants used as sources of food. *Albuquerque, Univ. of New Mex., Bull.* 266, 1935.
107. Castetter, E. F., and Bell, W. H. Pima and Papago Indian agriculture. *New Mex. Quart. Rev.*, vol. 16, 1943. 245 p.
108. Castetter, E. F., and Opler, M. E. The ethnobiology of the chiricahua and mescalero Apache. A. The use of plants for foods, beverages and narcotics. *Univ. of New Mex. Bull., Ethnobiological Studies in the American Southwest III*, 1936.
109. Castro, J. d. *Fisiología dos Tabús*. Rio de Janeiro: a. Edição. Oficina Grafica Manúa Ltda., 1941. 63 p.
110. Cathcart, E. P., and Murray, A. M. T. A study in nutrition; an inquiry into the diet of 154 families of St. Andrews. London, Privy Council, Med. Res. Council. Spec. Rept. Series No. 151, H. M. Stationery Off., 1931. 60 p.
111. Cathcart, E. P., and Murray, A. M. T. Studies in nutrition: an inquiry into the diet of families in Cardiff and Reading. London, H. M. Stationery Off., 1932. 28 p.
112. Cathcart, E. P., and Murray, A. M. T. A dietary survey in terms of the actual foodstuffs consumed. London, Privy Council, Med. Res. Council. Spec. Rept. Series No. 218, H. M. Stationery Off., 1936. 56 p.
113. Cathcart, E. P., Murray, A. M. T., and Beveridge, J. B. An inquiry into the diet of families in the highlands and islands of Scotland. *Studies in nutrition*. London, Privy Council, Med. Res. Council. Spec. Rept. Series No. 242, H. M. Stationery Off., 1940. 37 p.
114. Chaney, L. B., and McGraw, M. B. A study of 125 neonates. *Bull. of Neurolog. Inst.*, 2:1-56, 1932.
115. Chaplin, I. P. The equilibrium between carbohydrate and protein appetites as studied by the preference method under conditions of group self-selection maintenance. *Psych. Bull.*, 39:590, 1942.
116. Charles, J. A. A study of the diets of 69 working class families in Newcastle upon Tyne. Newcastle upon Tyne, Health Dept., Town Hall, December 1936. 45 p.

117. Cheng, L. T., and Ku, H. C. A dietary study of the middle-class Chinese and Mohammedans in Sungpan. *Sci. Soc. China, Biol. Lab. Contrib., Zool. Ser.*, 13: 91-99, 1939.
118. Cheng, L. T., Tao, H., and Chu, C. K. A study of the winter dietary in Nanking. *Sci. Soc. China, Biol. Lab. Contrib., Zool. Ser.*, 10: 291-302, 1935.
119. Childs, A. Some dietary studies of Poles, Mexicans, Italians and Negroes. *Child Health Bull.*, 9: 84-91, 1933.
120. Ciccarelli, E. Emotional factors operating as primary causes of malnutrition. *Understanding the Child*, 11: 7-10, 1942.
121. City of New York. Department of Welfare. Characteristics of the Italian dietary. 1938.
122. Clapp, E. V. W. An analysis of the food consumption of 119 farm families in Connecticut, 1936. Univ. of Chicago. M.S. thesis.
123. Clark, F. Le G. The school child and the school canteen. Hertford, Herts., Eng., Stephen Austin & Sons, Ltd., 1942. 35 p.
124. Clark, F. Le G. The communal restaurant, a study of the place of civic restaurants in the life of the community. London Council of Soc. Service, p. 3-36, 1943.
125. Clark, F. Le G. The school child's taste in vegetables. Hertford, Herts., Eng., Stephen Austin & Sons, Ltd., 1943. 14 p.
126. Clark, F. Le G. Food habits and how to change them. *Lancet*, 247: 53-55, 1944.
127. Clark, F. Le G., and McKay, H. S. Allocation of food within the family circle. Harpenden, Herts., Eng., 1943. 15 p. Mimeographed.

F. Le G. Clark has developed a method of using children's and adults' essays and responses to planned questionnaires and interviews to indicate qualitative as well as quantitative aspects of attitudes toward a given problem.

128. Clark, W. G., and Clausen, D. F. Dietary "self-selection" and appetites of untreated and treated adrenalectomized rats. *Am. J. Physiol.*, 139: 70-79, 1943.
129. Clayton, M. M. The relation of dietary habits and food resources of Maine people to their state of nutrition with respect to vitamin C. *Maine Agr. Exp. Sta. Bull.* 397, p. 724-726, 1939.
130. Clayton, M. M. A study of the food habits and nutritional status of children in selected communities in Maine. *Maine Agr. Exp. Sta. Bull.* 405, p. 431-456, 1941. See *Bull.* 401, 1940, by the same author.
131. Clayton, M. M. Food habits and physical condition of grade school children in Newport, Maine. *Maine Agr. Exp. Sta. Bull.* In press.
132. Cluver, E. H. Nutrition of the Union population. *J. Roy. Sanit. Inst.*, 59: 99-107, 1938.
133. Coco, L. C., Moore, M., Goldsmith, G. A., Lucas, G. P., and Davis, H. J. A study of the adequacy of diets consumed by grade-school and high-school students in Louisiana. *La. Agr. Exp. Sta. Bull.* 360, 1943. 10 p.
134. Coffin, M. The sources of the food used by Maryland farmers. *Md. Agr. Exp. Sta. Bull.* 346, p. 495-515, 1933.
135. Cohen, B. G. Emotions and food therapy. Boston, Simmons College, 1939. M. A. thesis.
136. Committee on Food Habits. The relationship between food habits and problems of wartime emergency feeding. The Committee, May 1942. 9 p. Mimeographed.
137. Committee on Food Habits. A study of some personality factors in block leaders in low income groups. The Committee, June 1943. 20 p. Mimeographed.
138. Committee on Food Habits. Contributions from the field of child development. *In The problem of changing food habits*, p. 149-157. See No. 6.
139. Committee on Food Habits. Contributions from the field of market research. *In The problem of changing food habits*, p. 141-148. See No. 6.

140. Committee on Food Habits. Feeding liberated countries and nutrition education. *In* The problem of changing food habits, p. 162-164. *See No. 6.*
141. Committee on Food Habits. Impact of the war on local food habits. *In* The problem of changing food habits, p. 168-169. *See No. 6.*
142. Committee on Food Habits. Local food sufficiency. *In* The problem of changing food habits, p. 159. *See No. 6.*
143. Committee on Food Habits. Problems of food supply, food habits, and nutrition in China. *In* The problem of changing food habits, p. 165-167. *See No. 6.*
144. Committee on Food Habits. Rationing and morale. *In* The problem of changing food habits, p. 160-161. *See No. 6.*
145. Committee on Food Habits. Research in the field of food habits. *In* The problem of changing food habits, p. 127-140. *See No. 6.*
146. Committee on Food Habits. Supplementing the role of the nutritionist at the household level. *In* The problem of changing food habits, p. 158. *See No. 6.*
147. Committee on Food Habits. The wartime role of the nutritionist. *In* The problem of changing food habits, p. 158. *See No. 6.*
148. Committee on Food Habits. Problems of food distribution in countries differently affected by the war. The Committee, December 1943. 11 p. Mimeographed.
149. Committee on Food Habits. Acute food problems under war conditions. The Committee, February 1944. 30 p. Mimeographed.
150. Committee on Food Habits. Research on appetite levels. The Committee, February 1944. 54 p. Mimeographed.
151. Committee on Food Habits. Application of anthropology to problems of nutrition and population. The Committee, April 1944. 37 p. Mimeographed.
152. Common Council for American Unity. What's cooking in your neighbor's pot. New York, N. Y. Mimeographed, 1944.
153. Conrad, A. The attitude toward food. *Am. J. Orthopsychiat.*, 7: 360-367, 1937.
154. Contribution to the study of nutritional status in rural and urban populations. *Pa. St. Coll. Bull.*, vol. 36, no. 52, 1942. 60 p.
 - I. Mack, P. B., Smith, J. M., Logan, C. H., O'Brien, H. T., Baur, M., Stewart, A. H., and Dodds, P. Résumé of Pennsylvania human nutrition studies from 1935 to 1941.
 - II. Mack, P. B., Urbach, C., Smith, J. M., Rose, E. K., Logan, C. H., O'Brien, A. T., Baur, M., Freeman, L. V., Bleil, D. R., Stewart, A. H., and Dodds, P. Preliminary report on 1,362 metropolitan school children, 1941-1942.
155. Cook, S. F. The mechanism and extent of dietary adaptation among certain groups and Nevada Indians. Berkeley, Univ. of Calif. Press, 1941. 59 p.
156. Cowles, M. L. A study of winter food consumption in Wisconsin farm families. *J. Am. Dietetic Assoc.*, 11: 322-330, 1935.
157. Cowles, M. L. Food consumption of Wisconsin relief families. *Wisc. Agr. Exp. Sta., Stencil Bull.* February 1937. 27 p.
158. Culwick, G. M. Nutrition work in British African colonies since 1939. *Africa*, 14: 24-26, 1943.
159. Cummings, R. O. The American and his food. Univ. of Chicago Press, 1941. 291 p.

Systematic historical account of food habits in U. S., with particular reference to social and technological influences on the diet, and to the development of the national nutrition program.
160. Cushing, F. H. Zuni breadstuff. *Ind. Notes and Monogr.*, vol. 8, 1920. New York, Mus. of the Am. Ind., Heye Found.
161. Cussler, M. T. Cultural sanctions of the food pattern in the rural Southeast. Radcliffe College, 1943. Ph. D. thesis.
162. Cussler, M. T., and de Give, M. L. Interrelations between the cultural pattern and nutrition. U. S. Dept. of Agr., Ext. Serv. Circ. 366, August 1941.

163. Cussler, M. T., and de Give, M. L. Let's look it in the eye. U. S. Dept. of Agr., Consumers' Guide, March 15, 1942.
164. Cussler, M. T., and de Give, M. L. The effect of human relations on food habits in the rural Southeast. *Applied Anthropol.*, 1:13-18, 1942.
See also No. 175.
165. Cussler, M. T., and de Give, M. L. Foods and nutrition in our rural Southeast. *J. Home Econ.*, 35:280-282, 1943.
166. Cussler, M. T., and de Give, M. L. Outline of studies on food habits in rural Southeast. *In* The problem of changing food habits, p. 109-112. *See No. 6.*

M. T. Cussler made a comprehensive sociological field study of food habits in three localities in the Southeast. See "The Problem of Changing Food Habits," ⁶ for summary of work.

D

167. D'Agostino, M. A. Diet of the Italian people. Detroit Dept. of Public Welfare.
168. Dallenbach, J. W., and Dallenbach, K. M. The effects of bitter-adaptation on sensitivity to the other taste-qualities. *Am. J. Psych.*, 61:21-31, 1943.
169. Daver, M. B. Observations on dietary habits and nutritional conditions in Hyderabad State. *Indian Med. Assoc. J.*, 12:42-45, 1942.
170. Davies, E. S. The food consumption of rural school children. *Mass. Agr. Exp. Sta. Bull.* 241, p. 97-147, 1928.
171. Davis, C. M. Self-selection of diet by newly weaned infants. *Am. J. Dis. Child.*, 36:651-679, 1928.
172. Davis, C. M. Choice of formulas made by three infants throughout the nursing period. *Am. J. Dis. Child.*, 50:385-394, 1935.
173. Davis, C. M. Self-selection of food by children. *Am. J. Nursing*, 35:403-410, 1935.
174. de Give, M. L. Social interrelations and food habits in the rural Southeast. Radcliffe College, 1943. Ph. D. thesis.
See also Nos. 162-166.

M. L. de Give made a comprehensive sociological field study of food habits in three localities in the Southeast. See "The Problem of Changing Food Habits," ⁶ for summary of work.

175. de Give, M. L., and Cussler, M. T. Bibliography and notes on German food patterns. Comm. on Food Habits, Nat. Res. Council. February 1944. 19 p. Mimeographed.
176. Descartes, S. L., Pacheco, S. D., and Noguera, J. R. Food consumption studies in Puerto Rico. Puerto Rico Univ., Agr. Exp. Sta. Bull. 59, 1941. 76 p.
177. Desmond, A., and Baumgartner, L. Health education in nutrition. *Am. J. Pub. Health*, 34:967-973, 1944.
178. Deutsch, F. Prophylactic aspects of the malnutrition problem. *Nervous Child*, 3:195-215, 1944.
179. Deutsch, F. The choice of organ in organ neuroses. *Int. J. Psychoanalysis*, 20:252-262, 1939.
180. Dickins, D. A study of food habits of people in two contrasting areas of Mississippi. *Miss. Agr. Exp. Sta. Bull.* 245, 1927. 52 p.
181. Dickins, D. A nutrition investigation of Negro tenants in the Yazoo-Mississippi Delta. *Miss. Agr. Exp. Sta. Bull.* 254, 1928. 52 p.
182. Dickins, D. Home production of food for family consumption. *Miss. Farm Res.*, 4:1-8, 1941.
183. Dickins, D. Improving levels of living of tenant families. *Miss. Agr. Exp. Sta. Bull.* 365, January 1942. 18 p.
184. Dickins, D. Food preparation of owner and cropper farm families in the Shortleaf Pine Area of Mississippi. *Social Forces*, 22:56-63, 1943.
185. Dickins, D. Some effects of a white cornmeal shortage. *Miss. Agr. Exp. Sta. Paper No. 88, New Series*, 1944.

186. Dickins, D. Vegetable preferences of white and Negro children. *Miss. Farm Res.*, vol. 7, no. 9, 1944. 7 p.

D. Dickins has conducted studies within the framework of a state experiment station with particular reference to the sociological factors involved in food consumption.

187. Dickins, D., and Ford, R. N. Geophagy (dirt eating) among Mississippi Negro school children. *Am. Soc. Rev.*, 7:59-65, 1942.
188. Dietary thiamin levels and deficiency symptoms. *Nutrition Rev.*, 2:328-330, 1944.
189. Dodd, S. C. A controlled experiment on rural hygiene in Syria: a study in the measurement of rural culture patterns and of social forces. *Am. Univ. of Beirut, Soc. Sci. Studies*, vol. 7, 1936. 336 p.
190. Donath, W. F., Ochse, S. S., and Terra, Sr. G. J. A. Geld-en Producten-Huishouding, Volksvoeding en-Gezondheid in Koetowinangoen. Dept. van Economische Zaken, Archipel Drukkerij, Buitenzorg, 1934. (The function of money and products in relation to native diet and physical condition in Koetowinangoen (Java). Tr. by A. A. Hamilton.)
191. Donelson, E., Nelson, P. M., Pittman, M. S., Leverton, R. M., McKay, H., Kinsman, G. M., Armstrong, W., and Reynolds, M. S. The nutritional status of midwestern college women. To appear in *J. Am. Dietetic Assoc.*, March 1945.
192. Dorcus, R. M. Food habits: their origin and control. *J. Am. Dietetic Assoc.*, 18:738-740, 1942.
193. Dorcus, R. M., and Leeds, J. The relation between subjective estimates of the quality of certain food products and their cost. *Am. J. Psych.*, 55:261-264, 1942.
194. Dove, W. F. A study of the causes of nutritional deficiency diseases in the livestock and inhabitants of Maine with possible corrective methods secured from the utilization of Maine fishery products and the production of superior foods. *Maine Agr. Exp. Sta. Bull.* 375, p. 191-284, 1934.
195. Dove, W. F. A study of individuality in the nutritive instincts and of the causes and effects of variation in the selection of food. *Am. Nat.*, 69:469-544, 1935.
196. Dove, W. F. The nutritive instincts and food habits of superior individuals as guides to the nutritional requirements of the group. *Proc. Am. Soc. Animal Produc.*, p. 243-247, November 27-28, 1936.
197. Dove, W. F. The needs of superior individuals as guides to group ascendance: an experimental approach to the problem of "optimum environment." *J. Hered.*, 30:157-163, 1939.
198. Dove, W. F. A study of the relation of man and animals to the environment. *Maine Agr. Exp. Sta. Bull.* Part I, Bull. 380:187-204, 1935. II, Bull. 387:197-201, 1937. III, Bull. 391:263-267, 1938. IV, Bull. 397:726-773, 1939. V, Bull. 400:235-248, 1940. VI, Bull. 405:441-458, 1941.

A series of papers discussing the climate-soil-plant-animal-man inter-relationship, the relationship between nutritional deficiency diseases and food production, the use of food preference as a guide to the selection of foods, the genetic improvement of the vitamin content of preferred foods, the use of superior individuals in determining the optimum selection of foods, and the bioecological and bioeconomic applications of food production for use.

199. Dove, W. F. Appetite levels of food consumption: a technique for measuring foods in terms of psychological and nutritional values combined. *Human Biol.*, 15:199-220, 1943.
200. Dove, W. F. On the linear arrangement of palatability of natural foods with an example of varietal preference in Leguminosae and Cruciferae by a new, rapid laboratory method. *J. Nutrition*, 25:447-462, 1943.
201. Dove, W. F. The relative nature of human preference with an example in the palatability of different varieties of sweet corn. *J. Comp. Psych.*, 35:219-226, 1943.

202. Dove, W. F. Basic foods and the nutrition of populations: on the use of appetite levels of food consumption for ascertaining the basic foods required for the optimum nutrition of populations and appropriate to different regions or countries. *In* Research on appetite levels. Comm. on Food Habits, Nat. Res. Council, February 1944, p. 17-46. Mimeographed.

Starting from a biological background, has developed a survey technique for classifying foods according to familiarity of the people in a given region with them, preference value, and nutritive value, and, after a consideration of these factors, developing a plan for optimum nutrition by 1) improving genetically the nutritive value of the preferred food, and 2) relating the food needs and the food supply in a given region.

203. Downes, J. A study of food habits of tuberculous families in a Harlem area of New York City. *Milbank Mem. Fund Quart.*, 21: 164-181, 1943.
204. Downes, J., and Baranovsky, A. Food habits of families in the Eastern Health District of Baltimore in the winter and spring of 1943. *Milbank Mem. Fund Quart.*, 23: 161-192, 1944.
205. Drake, P., and Lamb, M. W. Study of the dietary and food practices of 63 families in Lubbock, Texas. *J. Am. Dietetic Assoc.*, 20: 528-529, 1944.
206. Drummond, J. C., and Wilbraham, A. *The Englishman's food*. London, J. C. Cape, 1939. 574 p.
207. Dubois, C. Attitudes toward food and hunger in Alor. *In* Spier, L., and others, ed. *Language, culture, and personality: essays in memory of Edward Sapir*. Menasha, Wis., Sapir Memorial Pub. Fund, p. 272-281, 1941.
208. Dunbar, H. F. *Emotions and bodily changes*. 2nd ed. New York, Columbia Univ. Press, 1938. 601 p.
209. Dunbar, H. F. *Psychosomatic diagnosis*. New York, Paul Hoeber, 1943. 741 p.
210. Dunbar, H. F., Wolfe, T. P., Tauber, E., Brush, A. L., with assistance of Rioch, J. McK., and Coffin, M. The psychic component of the disease process (including convalescence) in cardiac, diabetic and fracture patients. Part II. *Am. J. Psychiat.*, 95: 1310-1342, 1939.
211. Duncher, K. Experimental modification of children's food preferences through social suggestion. *J. Abn. and Soc. Psych.*, 33: 489-507, 1938.
212. Dunshee, M. E. A study of factors affecting the amount and kind of food eaten by nursery school children. *Child Developm.*, 2: 163-183, 1931.

E

213. Ebbs, J. H., Brown, A., Tisdall, F. F., Moyle, W. J., and Bell, M. Influence of improved prenatal nutrition upon the infant. *Canad. Med. Assoc. J.*, 46: 6-8, 1942.
214. Ebbs, J. H., Tisdall, F. F., and Scott, W. A. The influence of prenatal diet on the mother and child. *J. Nutrition*, 22: 515-526, 1941.
215. Eggan, F., and Pijoan, M. Some problems in the study of food and nutrition. *América Indígena*, 3: 9-22, 1943.
216. Eliot, A. A. Eating habits in relation to personality development of two- and three-year old children. *Genet. Psych. Monogr.*, 13: 399-481, 1933.
217. Elliott, M. H. The effect of change of reward on the maze performance of rats. *Univ. Calif. Pub. Psych.*, 4: 19-30, 1928.
218. Engel-Frisch, G. A study of the effects of odd-shifts upon the food habits of war workers. *In* The problem of changing food habits, p. 82-84. *See No. 6*.
219. England, N. J. The relation between health and intelligence in school children. Holland (Lincolnshire) County. *J. Hyg.*, 36: 74-94, 1936.
220. Erickson, I. The eating habits of the psychiatric patient. *Bull. Menninger Clin.*, 2: 54-60, 1938.
221. Erickson, M. H. Hypnotic investigation of psychosomatic phenomena: III. A controlled experimental use of hypnotic regression in the therapy of an acquired food tolerance. *Psychosom. Med.*, 5: 67-70, 1943.
222. Evvard, J. M. Is the appetite of swine a reliable indication of physiological needs? *Proc. Iowa Acad. Sci.*, 22: 375-403, 1915.

F

223. Family living studies. Hawaii Agr. Exp. Sta. Bien. Rept., p. 136, 1941-1942.
224. Fearing, F., and Ross, G. Behavior factors affecting body temperature in pigeons. II. General level of activity as modified by deprivation and ingestion of food with particular reference to the "hunger drive." *J. Comp. Psych.*, 22: 231-239, 1936.
225. Ferguson, H. H. Food industry: the investigation of consumers' taste preferences. *Human Factor*, 11: 399-405, 1937.
226. Festinger, L. Development of differential appetite in the rat. *J. Exp. Psych.*, 32: 226-234, 1943.
227. Festinger, L. Effect of container on food preferences. Comm. on Food Habits, Nat. Res. Council. March 1944. 23 p. Mimeographed.
228. Finan, J. L., and Taylor, L. F. Quantitative studies in motivation. I. Strength of conditioning in rats under varying degrees of hunger. *J. Comp. Psych.*, 29: 119-134, 1940.
229. Firth, R. Sociological study of native diet. *Africa*, 7: 401-414, 1934.
230. Firth, R. Housekeeping among Malay peasants. London Sch. of Econ. and Pol. Sci., Monogr. on Soc. Anthropol., no. 7, 1943. 198 p.
231. Fitts, P. M. Some relationships between the hunger drive and experimental extinction. *Psych. Bull.*, 33: 600-601, 1936.
232. Fitts, P. M. Factors influencing the rate of eating of the white rat. *Psych. Bull.*, 34: 539, 1937.
233. Fortes, M., and Fortes, S. L. Food in the domestic economy of the Tallensi. *Africa*, 9: 237-276, 1936.
234. Frank, M. The effect of a rickets-producing diet on the learning ability of white rats. *J. Comp. Psych.*, 13: 81-105, 1932.
235. Franke, K. W., and Potter, V. R. The ability of rats to discriminate between diets of varying degrees of toxicity. *Science*, 83: 330-332, 1936.
236. Frayser, M. E. Children of preschool age in selected areas of South Carolina. *S. C. Agr. Exp. Sta. Bull.* 260, 1929. 80 p.
237. Frayser, M. E., and Moser, A. M. The diet of school children in relation to their health. *S. C. Agr. Exp. Sta. Bull.* 268, 1930. 64 p.
238. Fremont-Smith, F. The influence of emotional factors upon physiological and pathological processes. *Bull. N. Y. Acad. Med.*, 15: 560-569, 1939.
239. French, R. L. A method and apparatus for demonstrating olfactory sensitivity in the rat. *J. Comp. Psych.*, 29: 307-313, 1940.
240. Friesenhahn, H. Untersuchungen über die Appetitsrichtungen und den Speiseabscheu bei Schulkindern. *Zsch. f. Kinderforsch.*, 40: 1-54, 1932.
241. Fritz, M. F. Maze performance of the white rat in relation to unfavorable salt mixture and vitamin B deficiency. *J. Comp. Psych.*, 13: 365-390, 1932.
242. Fritz, M. F. A classified bibliography on psychodietetics. *Psych. Monogr.*, vol. 46, no. 206, 1934. 53 p.

Classifies references and discussion according to abnormal physical and mental conditions.

243. Fritz, M. F. The effect of diet on intelligence and learning. *Psych. Bull.*, 32: 355-363, 1935.
244. Fuller, R. W. The effect of home produced foods upon the eating habits of pre-school children in Henderson County, Texas. *Prairie View Sta. College*, 1942. M. A. thesis.
245. Furnas, C. C. and S. V. Man, bread, and destiny: the story of man's food. New York, Reynal & Hitchcock, 1937. 364 p.

G

246. Gamio, M. An analysis of social processes and the obstacles to agricultural progress in Mexico. *Rural Soc.*, 2: 143-147, 1937.

247. Gangulee, N. Bibliography of nutrition in India. London, Oxford Univ. Press, 1940. 79 p.
248. Gantt, W. H. Extension of a conflict based upon foods to other physiological systems and its reciprocal relations with sexual functions. *Am. J. Physiol.*, 123: 73-74, 1938.
249. Gaston, H. P. Consumer demand for apples in Michigan. *Mich. Agr. Exp. Sta. Spec. Bull.* 209, 1931. 50 p.
250. Gauger, M. E. The modifiability of response to taste stimuli in the preschool child. *Teach. Coll. Contrib. Educ.*, no. 348, 1929. 53 p.
251. Gilbert, F. D. New Mexican diets. *J. Home Econ.*, 34: 668-669, 1942.
252. Gillett, L., and Rice, P. Influence of education on the food habits of some New York City families. *N. Y. Assoc. for Improving the Condition of the Poor*, 1931. 48 p.
253. Gillin, J. Houses, food, and the contact of cultures in a Guatemalan town. *Acta Americana*, vol. 1, p. 344-359, 1943.
254. Gold, Leah. Changing student food habits through school programs. *J. School Health*, 15: 7-14, 1945.
255. Govande, G. K. A statistical examination of taste differences in bajra varieties. *Current Sci.*, vol. 10, p. 179-180, 1941.
256. Graham, J. C. Individuality of pullets in balancing the ration. *Poultry Sci.*, 13: 34-39, 1934.
257. Graham, W. R. Can we learn anything from a free choice of feeds as expressed by chickens? *Poultry Sci.*, 11: 365-366, 1932.
258. Graper, F. M., and Park, E. W. The effect of improved feeding on the physical and mental development of under-nourished and backward children. *J. Home Econ.*, 15: 627-632, 1923.
259. Graubard, M. Man's food, its rhyme and reason. New York, Macmillan, 1943. 213 p.
 Illustrated by examples of the "non-rational" nature of traditional food practices as a comment on the history of thought and the need for the application of nutritional science.
260. Greenwood, M. L., and Lonsinger, B. N. Food intake of college women: caloric intake and energy requirement. *J. Am. Dietetic Assoc.*, 20: 524-527, 1944. See also 20: 671-675, 1944.
261. Gregory, E., Jackson, C., and McLaughlin, E. C. G. New Zealand dietary studies. I. Dietary studies of one hundred and seventy families of varying occupations. *N. Z. Med. J.*, 42: 64-72, 1943.
262. Grindley, G. C. Experiments on the influence of the amount of reward on learning in young chickens. *Brit. J. Psych.*, 20: 173-180, 1929.
263. Grisby, N. E., McBryde, L. C., and Davis, H. J. A study of the adequacy of diets of Farm Security Administration families in Louisiana. Baton Rouge, La. St. Univ., Coll. of Agr., Nutr. Lab., September 1942. Mimeographed.
264. Gross, I. H. A survey of food habits in a Hungarian mining town. *J. Home Econ.*, 17: 315-321, 1925.
265. Guhl, A. M., and Allee, W. C. Some measurable effects of social organization in flocks of hens. *Physiol. Zool.*, 17: 320-347, 1944.
266. Guthe, C. E. History of the Committee on Food Habits. *In* The problem of changing food habits, p. 9-19. See No. 6.
267. Gutierrez, M., and Santos, F. O. The food consumption of 104 families in Paco District, Manila. *Phil. J. Sci.*, 66: 397-416, 1938.

H

268. Haggard, H. W., and Greenberg, L. A. Between-meal feeding in industry: effects on the absenteeism and attitude of clerical employees. *J. Am. Dietetic Assoc.*, 15: 435-439, 1939.

269. Hall, I. S., and Hall, C. S. A study of disliked and unfamiliar foods. *J. Am. Dietetic Assoc.*, 15: 540-548, 1939.
270. Hammargren, S., and Porje, I. Changes in the symptom picture in three cases of acute psychosis after administration of vitamin B₁, pyrophosphate, and fumarate. *Svenska Läkartidn.*, 37: 1893-1898, 1940.
271. Hardy, M. C., Spohn, A., Austin, G., McGiffert, S., Mohr, E., and Peterson, A. B. Nutritional and dietary inadequacies among city children from different socio-economic groups. *J. Am. Dietetic Assoc.*, 19: 173-181, 1943.
272. Harlow, H. F. Food preferences of the albino rat. *J. Genet. Psych.*, 41: 430-437, 1932.
273. Harlow, H. F. Social facilitation of feeding in the albino rat. *J. Genet. Psych.*, 41: 211-221, 1932.
274. Harlow, H. F., and Yudin, H. C. Social behavior of primates. I. Social facilitation of feeding in the monkey and its relation to attitudes of ascendance and submission. *J. Comp. Psych.*, 16: 171-185, 1933.
275. Harrell, R. F. Effect of added thiamine on learning. *Teach. Coll. Contrib. Educ.*, no. 877, 1943. 55 p.
276. Harris, L. J., Clay, J., Hargreaves, F. J., and Ward, A. Appetite and choice of diet. The ability of the vitamin B deficient rat to discriminate between diets containing and lacking the vitamin. *Proc. Roy. Soc. London, Series B*, 113: 161-190, 1933.
277. Harris, R. S., Weeks, E., and Kinde, M. Effect of a supplementary food on the nutritional status of school children. *J. Am. Dietetic Assoc.*, 19: 182-189, 1943.
278. Hausmann, M. F. The behavior of albino rats in choosing food and stimulants. *J. Comp. Psych.*, 13: 279-309, 1932.
279. Hausmann, M. F. The behavior of albino rats in choosing foods. II. Differentiation between sugar and saccharin. *J. Comp. Psych.*, 15: 419-428, 1933.
280. Hausmann, M. F. Tierexperimentelle Untersuchungen zur Erforschung der Bedürfnisse. *Schweiz. Arch. Neurol. Psychiat.*, 34: 254-266, 1934.
281. Hawks, J. E. Preparation and composition of foods served in Chinese homes. *J. Am. Dietetic Assoc.*, 12: 136-140, 1936.
282. Hawley, F., Pijoan, M., and Elkin, C. A. An inquiry into food economy and body economy in Zia Pueblo. *Am. Anthropol.*, 45: 547-556, 1943.
283. Hellersberg, E. F. Food habits of adolescents in relation to their socio-psychological adjustment. In ms. form.

Working from the point of view of analytic psychology, has developed a questionnaire technique to be used with adolescents and their mothers, in which the food preference items are repeated for both groups and the other questions are rephrased appropriately for the mothers, but cover the same items of childhood behavior and habits as the questions given the adolescents.

284. Hellmann, E. Urban native food in Johannesburg. *Africa*, 9: 277-290, 1936.
285. Heron, W. T., and Skinner, B. F. Changes in hunger during starvation. *Psych. Rec.*, 4: 51-60, 1937.
286. Hill, J. Infant feeding and personality disorders. A study of early feeding in its relation to emotional and digestive disorders. *Psychiat. Quart.*, 11: 356-382, 1937.
287. Hiralal, R. B. Some notes about marriage, food, drink, and occupations of caste affecting social status in the central provinces. *Man in India*, 5: 56-68, 1925.
288. Hobson, A., and Schaars, M. A. Consumer preferences for cheese. *Wisc. Agr. Exp. Sta. Res. Bull.* 128, 1935. 48 p.
289. Hoelzel, F. An explanation of appetite. *Am. J. Diges. Dis.*, 4: 71-76, 101-108, 1944.
290. Holden, F. A study of the effect of starvation upon behavior by means of the obstruction method. *Comp. Psych. Monogr.*, vol. 3, 1925-1926. 45 p.
291. Hollen, E., and Mack, P. B. A study of the dietary status of school children of different national and racial backgrounds in an anthracite coal region of Pennsylvania. *Chemistry Leaflet, Pa. St. Coll.*, vol. 17, no. 11, 1944.
292. Hollinger, M., and Roberts, L. J. Overcoming food dislikes: a study with evaporated milk. *J. Home Econ.*, 21: 923-932, 1929.

293. Honigmann, John J. Foodways of the Fort Nelson Indians. 1943. 16 p. Ms. in Off. of Med. Services, Dept. of Indian Affairs, Ottawa, Can.
294. Howe, P. E. Can food habits be changed? *In Food and life*, p. 131-138. *See No. 24.*
295. Huenemann, R. L., and Turner, D. Methods of dietary investigation. *J. Am. Dietetic Assoc.*, 18: 562-568, 1942.
296. Hunt, J. McV. Effect of feeding frustration in infancy upon adult hoarding in the white rat. *Psych. Bull.*, 37: 487-488, 1940.
297. Hunt, J. McV. Effect of infant feeding-frustration upon adult hoarding in the albino rat. *J. Abn. and Soc. Psych.*, 36: 338-360, 1941.
298. Hunter, G., and Pett, L. B. A dietary survey in Edmonton. *Canad. Pub. Health J.*, 32: 259-265, 1941.

I

299. Internat. Inst. of African Languages and Cultures. The food and nutrition of African natives. Memorandum 13. London, Oxford Univ. Press, 1937.

Contains extensive bibliography of work in diet and nutrition done in Africa.

J

300. Jackson, P., and Schuck, C. Nutritional adequacy of foods purchased by college women on limited and more liberal food budgets. *J. Am. Dietetic Assoc.*, 17: 784-789, 1941.
301. Jacob, H. E. Tr. by R. and C. Winston. Six thousand years of bread. New York, Doubleday, 1944. 399 p.
302. Jaffa, M. E. Nutrition investigations among fruitarians and Chinese at the California Agricultural Experiment Station. *Calif. Agr. Exp. Sta. Bull.* 107, 1899-1901. 43 p.
303. Jakway, I. Voluntary activity in the rat as related to intake of whole yeast. *J. Comp. Psych.*, 26: 157-162, 1938.
304. Jelliffe, S. E. Sketches in psychosomatic medicine. *Nerv. Ment. Dis. Monogr.*, no. 65, 1939.
305. Joffe, N. F. Some Central European food patterns and their relationship to wartime programs of food and nutrition. Comm. on Food Habits, Nat. Res. Council. January 1943. 3 p. Mimeographed.
306. Joffe, N. F. Some Central European food patterns and their relationship to wartime problems of food and nutrition. Hungarian food patterns. Comm. on Food Habits, Nat. Res. Council. February 1943. 10 p. Mimeographed.
307. Joffe, N. F. Food habits of selected subcultures in the United States. *In The problem of changing food habits*, p. 97-103. *See No. 6.*
308. Joffe, N. F. Tests of acceptability of emergency rations. *In The problem of changing food habits*, p. 104. *See No. 6.*
See also Nos. 54, 414, 449, 484.
309. Joffe, N. F., Janis, M., Shippee, E., and Woodward, P. Role of milk in American culture. Comm. on Food Habits, Nat. Res. Council. October 1943. 40 p. Mimeographed.
310. Joffe, N. F., and Walker, T. T. Some food patterns of Negroes in the United States of America and their relationship to wartime problems of food and nutrition. Comm. on Food Habits, Nat. Res. Council. April 1944. 50 p. Mimeographed.

N. F. Joffe has developed an anthropological technique for studying the food habits of nationality groups in this country and of other countries by use of informants and consultation of the literature. Also has developed a method of experimentally testing the acceptability of food.

311. Jukes, C. L. Selection of diet in chicks as influenced by vitamins and other factors. *J. Comp. Psych.*, 26: 135-156, 1938.

K

312. Katz, D. Die Gesetz der Nahrungsaufnahme in ihrer grundsätzlichen Bedeutung für die Bedürfnispsychologie. (The laws of food intake in their fundamental significance for the psychology of need.) *Indus. Psychotechn.*, 10: 28-29, 1933.
313. Katz, D. Some problems of human feeding in relation to industrial psychology. *Human Factor*, 9: 127-237, 1935.
314. Katz, D. A study of the taste of bread. *Human Factor*, 11: 210-217, 1937.
315. Kelly, H. T., and Sheppard, M. Dietary study of subjects from upper income groups. *New Eng. J. Med.*, 228: 118-124, 1943.
316. Kephart, H. Our southern highlanders. New York, Macmillan, 1929. 469 p.
317. Keys, A. Physical performance in relation to diet. *Fed. Proc.*, 2: 164-187, 1943.
318. Keys, A., Henschel, A., Taylor, H. L., Mickelsen, O., and Brozek, J. Absence of rapid deterioration in men doing hard physical work on a restricted intake of vitamins of the B complex. *J. Nutrition*, 27: 485-495, 1944.
319. King, A. A study of the Italian diet in a group of New Haven families. Yale University, 1935. M. A. thesis.
320. Kiss, P. V. Die Behandlung der Nerven-Krankheiten in Kindesalter durch Vitamin B₁. (The treatment of nervous diseases in childhood with vitamin B₁). *Arch. Kinderheilk*, 119: 182-193, 1940.
321. Kleiber, M., and Smith, A. H. Eating habits and fasting metabolism of rats. *Proc. Soc. Exp. Biol.*, 45: 630-632, 1940.
322. Koch, A. M., and Warden, C. J. The influence of quantitative stunting on learning ability in mice. *J. Genet. Psych.*, 48: 215-217, 1936.
323. Kon, S. K. The self-selection of food constituents by the rat. *Biochem. J.*, 25: 473-481, 1931.
324. Koos, E. L. Food in the lives of our neighbors. New York, District Health Comm., Kips Bay-Yorkville Health Dist. August 1942. 47 p.

A summary of this study is in "The Problem of Changing Food Habits,"⁶ p. 74-81.

325. Kooser, J. H., and Blankenhorn, M. A. Pellagra and the public health: a dietary survey of Kentucky mountain folk in pellagrous and in nonpellagrous communities. *J. Am. Med. Assoc.*, 116: 912-915, 1941.
326. Kostelny, A. Folk foods of a Slovakian village. *J. Am. Dietetic Assoc.*, 11: 99-104, 1935.
327. Kruse, H. D., Palmer, C. E., Schmidt, W., and Wiehl, D. G. Medical evaluation of nutritional status. I. Methods used in a survey of high school students. *Milbank Mem. Fund Quart.*, 18: 257-298, 1940.
328. Kuschke, B. M. Food habits in Rhode Island. *R. I. Agr. Exp. Sta. Bull.* 291, 1944. 25 p.
329. Kuschke, B. M., and Whittemore, M. The use of milk, fruit, and vegetables in the diet of rural Rhode Island school children. *R. I. Agr. Exp. Sta. Bull.* 253, 1935. 18 p.

L

330. Laird, D. A., and Breen, W. J. Sex and age alterations in taste preferences. *J. Am. Dietetic Assoc.*, 15: 549-550, 1939.
331. Langford, W. S. The psychological aspects of feeding in early childhood. *J. Am. Dietetic Assoc.*, 17: 208-216, 1941.
332. Langworthy, G. F. Food customs and diet in American homes. U. S. Dept. of Agr., Off. of Exp. Sta. Circ. 110, 1911.
333. Lasswell, H. D. The contribution of Freud's insight interview to the social sciences. *Am. J. Soc.*, 45: 375-390, 1939.

334. Lautz, A., Carter, C., and Ferguson, S. Meat, sea food, eggs, and milk in the self-selected diets of college men and women. *J. Home Econ.*, 32:615-616, 1940.
335. Lee, W. Y., Reid, E., and Read, B. E. Industrial health in Shanghai, China. III. Shanghai factory diets compared with those of institutional workers. *Chinese Med. Assoc., Spec. Rept., Series No. 7.* September 1936.
336. Leichsenring, J. M., Donelson, E. G., Deinard, H. H., Pittman, M. S., Coopridge, M., and Haggart, V. Diets of 524 high school girls. *J. Home Econ.*, 35:583-586, 1943.
337. Leverton, R. M., and Marsh, A. G. Comparison of food intakes for weekdays and for Saturday and Sunday. *J. Home Econ.*, 31:111-114, 1939.
338. Levin, C. M. A study of Jewish food habits. *J. Am. Dietetic Assoc.*, 9:389-396, 1934.
339. Levine, R., Chein, I., and Murphy, G. The relation of the intensity of a need to the amount of perceptual distortion: a preliminary report. *J. Psych.*, 13:283-293, 1942.
340. Lewin, K. Dynamics of group action. *Educ. Leader*, 1:195-200, 1944.
341. Lewin, K. Forces behind food habits and methods of change. *In* The problem of changing food habits, p. 35-65. *See No. 6.*
342. Lewin, K. A group test for determining the anchorage points of food habits. *Comm. on Food Habits, Nat. Res. Council.* June 1942. 21 p. Mimeographed.
 Open-ended projective technique suitable for children from 4th grade through high school; provides information concerning likes and dislikes, usual foods eaten, and the types of people (mother, father, doctor, etc.) whom the child considers as "authorities" related to specific kinds of foods.
343. Lewin, K. The relative effectiveness of a lecture method and a method of group decision for changing food habits. *Comm. on Food Habits, Nat. Res. Council.* June 1942. 9 p. Mimeographed.
See also Nos. 227, 645.
 Has directed a series of studies of food habits from the psychological point of view. *See* "The Problem of Changing Food Habits,"⁶ for a summary of one of the larger studies.
344. Liddell, H. S. Conditioned reflex method and experimental neurosis. *In* Hunt, J. McV., *Personality and the behavior disorders.* New York, Ronald Press, 1944, p. 389-412.
345. Lindstedt, H. Food consumption habits in the Far East. *Monthly Bull. Agr. Econ. Soc.*, 29:399E-413E, 1938.
346. Lindstedt, H. Food consumption habits in China. *Monthly Bull. Agr. Econ. Soc.*, 30:363E-389E, 1939.
347. Linton, R. S. Crops, soils, and culture in America. *In* The Maya and their neighbors, p. 32-40. New York, Appleton-Century, 1940.
348. Liston, M. I. A study of quality demands in household buying of food. *Vt. Agr. Exp. Sta. Bull.* 415, 1937. 39 p.
349. Loomis, C. P., and Grisham, G. Spanish Americans: the New Mexican experiment in village rehabilitation. *Applied Anthrop.*, 2:13-37, 1943.
350. Lu, G. J., and Hinder, E. M. Nutrition and reconstruction in China. Montreal, Intern. Labour Off. In press.
351. Lu, G. D., and Needham, J. History of Chinese dietetics. *Isis*, 1939.
352. Luchi, A. L. Diabetes: VI. Diabetic diets and eating habits of nationalities. *Penn. Med. J.*, 44:41-44, 1940.
353. Lukomnik, M. An experiment to test the canalization hypothesis. Columbia Univ. Library. M. A. thesis.
354. Lund, E. M. The educational effectiveness of a school cafeteria in relation to food selection, social customs, and civic responsibilities. Ames, Iowa, Iowa State Coll., Dept. of Home Econ. Ed., 1939. 70 p. Graduate thesis.

355. Lurie, O. R. Psychological factors associated with eating difficulties. *Am. J. Orthopsychiat.*, 11:452-467, 1941.

M

356. McCance, R. A., Widdowson, E. M., and Verdon-Roe, C. H. A study of English diets by the individual method. III. Pregnant women at different economic levels. *London, Hyg.*, 38:596-622, 1938.
357. McCarrison, R. A good diet and a bad one: an experimental contrast. *Ind. J. Med. Res.*, 14:649-654, 1927. Supplement.
358. McCarrison, R. Problems of nutrition in India. *Nutrition Abstr. and Rev.*, 2:1-12, 1932.
359. McCarthy, D. Children's feeding problems in relation to the food aversions in the family. *Child Developm.*, 6:277-284, 1935.
360. McCay, C. M. Is longevity compatible with optimum growth? *Science*, 77:410-411, 1933.
361. McCay, J. B., and Bull, H. D. Ten "good" and ten "poor" eaters. *J. Pediat.*, 17:230-240, 1940.
362. McCay, J. B., Waring, E. B., and Kruse, P. J. Learning by children at noon-meal in a nursery school: ten "good" eaters and ten "poor" eaters. *Genet. Psychol. Monogr.*, 22:491-557, 1940.
363. McClelland, B. E. The length of the sampling periods in dietary studies. Univ. of Chicago, 1931. M.A. thesis.
364. McCord, F. The effect of frustration on hoarding in rats. *J. Comp. Psych.*, 32:531-541, 1941.
365. McFadden, H. B. The influence of temperature and solution concentration on reaction time to taste stimuli. *J. Psych.*, 4:349-363, 1937.
366. McHenry, E. W. Nutrition in Toronto. *Canad. Pub. Health J.*, 30:4-13, 1939.
367. Mack, P. B., and Smith, J. M. Methods of conducting mass studies in human nutrition. *Pa. State Coll. Bull.* 43, vol. 33, 1939. 91 p.
368. Mack, P. B., Smith, J. M., Logan, C. H., and O'Brien, A. T. Mass studies in human nutrition: nutritional status of children in a college community. *J. Am. Dietetic Assoc.*, 18:69-78, 1942.
369. Mack, P. B., Smith, J. M., Logan, C. H., O'Brien, A. T., and Smith, F. O. Human nutrition research and improvement in mass nutritional status. *Pa. State Coll. Bull.* 16, vol. 36, 1942.
- See also Nos. 154, 291, 679.*

P. B. Mack is directing comprehensive nutrition surveys in which various diagnostic measures of nutritional status are used and cultural factors are taken into account.

370. McKay, H., and Brown, M. A. Foods used by rural families in Ohio during a three-year period. *O. Agr. Exp. Sta. Bull.* 492, 1931. 37 p.
371. McKay, H., and Patton, M. B. A study of the food habits and physical development of preschool children over a two-year period, with special reference to seasonal variations in growth. *O. Agr. Exp. Sta. Bull.* 549, 1935. 72 p.
372. McKay, H., and Patton, M. B. Food consumption of college men. *O. Agr. Exp. Sta. Bull.* 646, 1943. 17 p.
373. McLaughlin, E. C. G. New Zealand dietary studies. II. Dietary survey among basic wage-earners. *N. Z. Med. J.*, 42:155-162, 1943.
374. MacLeish, K., and Hennefrund, H. E. Anthropology and agriculture: selected references on agriculture in primitive cultures. U. S. Dept. of Agr., Bur. Agr. Econ., *Agr. Econ. Bibliog.* 89, 1940. 134 p.

Annotated bibliography of studies chiefly of primitive societies in all parts of the world; well-indexed.

375. McMillan, T. J., and Leverton, R. M. The self chosen diets of college girls in a cooperative dormitory. *J. Home Econ.*, 35:514-518, 1943.
376. Malinowski, B. *Coral gardens and their magic*. London, Allen & Unwin, 1935. 2 v.
377. Margolin, S. E., and Bunch, M. E. The relationship between age and the strength of the hunger motivation. *Comp. Psych. Monogr.*, vol. 16, 1940. 34 p.
378. Maria, J. V. S. Nutrition in Chile. *J. Am. Dietetic Assoc.*, 20:312-314, 1944.
379. Marinho, H. Social influence in the formation of enduring preferences. *J. Abn. and Soc. Psych.*, 37:448-468, 1942.
380. Marshall, D. G. Changes in food habits and attitudes toward the food situation in Greendale, Wisconsin. *Comm. on Food Habits, Nat. Res. Council*. May 1943. 4 p. Mimeographed.
381. Marzowska, M., and McLaughlin, L. Polish food habits. *J. Am. Dietetic Assoc.*, 4:142-148, 1928.
382. Masani, K. M. Dietetic deficiencies and excesses in India. *Med. Bull. Bombay*, 6:431-442; 510-524; 541-553, 1938.
383. Maslow, A. H. The "emotion" of disgust in dogs. *J. Comp. Psych.*, 14:401-407, 1932.
384. Maslow, A. H. Comparative behavior of primates. VI. Food preferences of primates. *J. Comp. Psych.*, 16:187-197, 1933.
385. Maslow, A. H. Appetites and hungers in animal motivation. *J. Comp. Psych.*, 20:75-83, 1935.
386. Maslow, A. H. The influence of familiarization on preference. *J. Exp. Psych.*, 21:162-180, 1937.
- 386a. Maslow, A. H., and Groshong, E. Influence of differential motivation on delayed reactions in monkeys. *J. Comp. Psych.*, 18:75-83, 1934.
387. Masserman, J. H. *Behavior and neurosis: an experimental psychoanalytic approach to psychobiological principles*. Univ. of Chicago Press, 1943. 269 p.
388. Masserman, J. H. Psychodynamisms in anorexia nervosa and neurotic vomiting. *Psychoanalytic Quart.*, vol. 10, 1941.
389. Mathews, S. J. Food habits of Georgia rural people. *Ga. Agr. Exp. Sta. Bull.* 159, 1929. 31 p.
390. Maurer, S. (1) The effect of early depletion of vitamin B upon performance in rats. (2) The effect of vitamin A depletion upon performance in rats. (3) The effect of a diet of pasteurized milk upon performance in rats. *J. Comp. Psych.*, 20:385-395, 1935.
391. Maurer, S. III. The effect of partial depletion of vitamin B (B_1) upon performance in rats. *J. Comp. Psych.*, 20:309-317, 1935.
392. Maurer, S., and Tsai, L. S. Vitamin B deficiency in nursing young rats and learning ability. *Science*, 70:456-458, 1929.
393. Mead, M. How the Papuan plans his dinner. *Natural History*, 34:377-388, 1934.
394. Mead, M. Mountain Arapesh, an importing culture. *Anthrop. Papers Am. Mus. Nat. Hist.*, 36:139-149, 1938.
395. Mead, M. Problem of training the volunteer in community war work. *Sch. and Soc.*, 56:520-522, 1942.
396. Mead, M. Reaching the last woman down the road. *J. Home Econ.*, 34:710-713, 1942.
397. Mead, M. Anthropological approach to dietary problems. *Tr. N. Y. Acad. Sci. Series II*, 5:177-182, 1943.
398. Mead, M. Changing food habits. *In The nutrition front, report of the N. Y. State Joint Legislative Comm. on Nutrition*, p. 37-43, 1943.
399. Mead, M. Dietary patterns and food habits. *J. Am. Dietetic Assoc.*, 19:1-5, 1943.
400. Mead, M. Food and feeding in occupied territory. *Public Opinion Quart.*, p. 618-628, 1943.
401. Mead, M. Food therapy and wartime food problems. *J. Am. Dietetic Assoc.*, 19:201-202, 1943.
402. Mead, M. Committee on Food Habits. *Psych. Bull.*, 20:290-293, 1943.

403. Mead, M. Factor of food habits. *Ann. Am. Acad. Polit. Soc. Sci.*, 225:136-141, 1943.
404. Mead, M. Problem of changing food habits. *In* The problem of changing food habits, p. 20-29. *See No. 6.*
405. Mead, M. Problem of changing food habits: with suggestions for psycho-analytic contributions. *Bull. Menninger Clin.*, 7: 57-61, 1943.
406. Medlock, W. A study of the diet of the Southern Negro in Charlotte, N. C. Teachers College, 1927. Unpublished M. S. thesis.
407. Mellanby, E. Nerve degeneration and bone hypertrophy induced in young animals by diet. *J. Physiol.*, 93:42P-43P, 1938.
408. Meloan, E. L. Excessive appetite: a behavior symptom in maladjusted children. *J. Pediat.*, 19:632-637, 1941.
409. Métraux, R. M. Qualitative attitude analysis—a technique for the study of verbal behavior. *In* The problem of changing food habits, p. 86-94. *See No. 6.*

This method has been used in a series of studies conducted by the Committee on Food Habits, a partial list of which appears in "The Problem of Changing Food Habits"; a complete list can be obtained from the Committee office.

410. Milam, D. F. A nutrition survey of a small North Carolina community. *Am. J. Pub. Health*, 32:406-412, 1942.
411. Miller, C. D. A study of the dietary and value of living of 44 Japanese families in Hawaii. Honolulu, Univ. of Hawaii, 1938. 27 p.
412. Miller, G. A., and Viek, P. An analysis of the rat's response to unfamiliar aspects of the hoarding situation. *J. Comp. Psych.*, 37:221-231, 1944.
413. Mitchell, H. S. Planning foods for foreign relief. *J. Am. Dietetic Assoc.*, 19:820-823, 1943.
414. Mitchell, H. S., and Joffe, N. F. Food patterns of some European countries: background for study programs and guidance of relief workers. *J. Am. Dietetic Assoc.*, 20:676-687, 1944.
415. Mitchell, H. S., and Mendel, L. B. The choice between adequate and inadequate diet as made by rats and mice. *Am. J. Physiol.*, 58:211-225, 1921.
416. Mitra, D. O. A study of the diet of the Bengali Hindus and their nutrition. *Indian Med. Gaz.*, 74:226-229, 1939.
417. Mittlemann, B., Wolff, H. G., and Scharf, M. P. Emotions and gastroduodenal function: experimental studies on patients with gastritis, duodenitis, and peptic ulcer. *Psychosom. Med.*, 4:5-61, 1942.
418. Moir, H. C. Some observations on the appreciation of flavour in foodstuffs. *Chem. and Ind.*, 55:145-148, 1936.
419. Monnier, M. Altérations du système nerveux et des muscles striés chez le rat adulte carencé en vitamine E. (Changes of the nervous system and the striate muscles in E-avitaminotic adult rats.) *Z. Vitaminforsch.*, 11:235-258, 1941.
420. Moore, H., and Mathias, E. The effect of vitamin A deficiency on the maze-learning ability of the white rat. *J. Comp. Psych.*, 19:487-496, 1935.
421. Moore, I. H. The emotional content of food habits. *Proc. Archdiocesan Rural Life Conf. on Rural Prob. of N. M.*, July 1944.
422. Morey, N. B. A study of the food habits and health of farm families in Tompkins County, New York. Ithaca, Cornell Agr. Exp. Sta. Bull. 563, 1933. 83 p.
423. Morgan, C. T., and Morgan, J. D. Studies in hunger: I. The effects of insulin upon the rat's rate of eating. *J. Genet. Psych.*, 56:137-147, 1940.
424. Morgan, C. T., and Morgan, J. D. Studies in hunger. II. The relation of gastric denervation and dietary sugar to the effect of insulin upon food intake in the rat. *J. Genet. Psych.*, 57:153-163, 1940.
425. Morgan, C. T., Stellar, E., and Johnson, O. Food-deprivation and hoarding in rats. *J. Comp. Psych.*, 35:275-296, 1943.

426. Moser, A. M. Food consumption and use of time for food work among farm families in the South Carolina Piedmont. *S. C. Agr. Exp. Sta. Bull.* 300, 1935. 80 p.
427. Moser, A. M. Farm family diets in the lower coastal plains of South Carolina. *S. C. Agr. Exp. Sta. Bull.* 319, 1939. 80 p.
428. Moser, A. M. Food habits of South Carolina farm families. *S. C. Agr. Exp. Sta. Bull.* 343, 1942. 38 p. *See also* *S. C. Exp. Sta. Rept.*, 1941, p. 25-30.
429. Mowrer, O. H. Animal studies in the genesis of personality. *Tr. N. Y. Acad. Sci.*, 3: 8-11, 1940.
430. Mudge, G. G. Italian dietary adjustments. *J. Home Econ.*, 15: 181-185, 1923.
431. Mudge, G. G. Polish dietary studies. *Modern Hosp.*, 22: 503-504, 1924.
432. Muenzinger, K. F., and Fletcher, F. M. Motivation in learning. VI. Escape from electric shock compared with hunger-food tension in the visual discrimination habit. *J. Comp. Psych.*, 22: 79-91, 1936.
433. Muenzinger, K. F., Poe, E., and Poe, C. F. The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. II. Vitamin B₂ (G). *J. Comp. Psych.*, 23: 59-66, 1937.
434. Munsell, H. E. Food and nutrition problems in Puerto Rico. *J. Am. Dietetic Assoc.*, 20: 305-307, 1944.
435. Murphy, E. A study of vitamin C nutrition in a group of school children. II. Dietary evaluations. *J. Nutrition*, 21: 527-539, 1941.
436. Murphy, G., Murphy, L. B., and Newcomb, T. M. Experimental social psychology: an interpretation of research upon the socialization of the individual. New York, Harper, 1937. 1121 p.
437. Murrah, P. The classroom teacher and nutrition education. *Understanding the Child*, 11: 25-29, 1942.
438. Mursell, J. L. Contributions to the psychology of nutrition: I. Hunger and appetite. *Psych. Rev.*, p. 317-333, 1925.
439. Muse, M., and Gillum, I. Food consumption of fifty Vermont farm households. *Vt. Agr. Exp. Sta. Bull.* 327, 1931. 30 p.
440. Myrdal, G., Sterner, R. M. E., and Rose, A. The American dilemma: the Negro problem and modern democracy. New York, Harper, 1944. 2 v. Append. 1, vol. 2.

N

441. Nachmansohn, D., and Steinbach, H. B. Localization of enzymes in nerves: I. Succinic dehydrogenase and vitamin B₁. *J. Neurophysiol.*, 5: 109-120, 1942.
442. Nelson, P. M., Hoyt, E. E., McLaughlin, L., and Morgan, E. C. The food consumption habits of 145 Iowa farm families. *Iowa Agr. Exp. Sta. Bull.* 337, p. 329-359, 1935.
443. Nevins, W. B. Experiments in the self-feeding of dairy cows. *Ill. Agr. Exp. Sta. Bull.* 289, 1927.
444. New York City Comm. on Mental Hygiene of the State Charities Aid Assoc. Child Guidance Leaflets. Series on Eating. 1943. 14 leaflets.
445. New York Nutrition Assoc. Diets of Italians in New York City. 1935.
446. Nissen, H. W., and Crawford, M. P. A preliminary study of food-sharing behavior in young chimpanzees. *J. Comp. Psych.*, 22: 383-419, 1936.
447. Nissen, H. W., and Elder, J. H. The influence of amount of incentive on delayed reaction performances of chimpanzees. *J. Genet. Psych.*, 47: 49-72, 1935.
448. Niyogi, S. P., and Sukhatankar, D. R. A dietary survey in Bombay. *Indian Med. Gaz.*, 74: 674-679, 1939.
449. Nizzardini, G., and Joffe, N. F. Italian food patterns and their relationship to war-time problems of food and nutrition. Comm. on Food Habits, Nat. Res. Council. August 1942. 22 p. Mimeographed.
450. Nowlis, V. Companionship preference and dominance in the social interaction of young chimpanzees. *Comp. Psych. Monogr.*, vol. 17, no. 1, 1941. 57 p.

451. Nowlis, V. The relation of degree of hunger to competitive interaction in chimpanzees. *J. Comp. Psych.*, 32: 91-115, 1941.
452. Nowlis, V. Sexual status and degree of hunger in chimpanzee competitive interaction. *J. Comp. Psych.*, 34: 185-194, 1942.
453. Nutrition research in the British Colonial Empire. Imp. Bur. Anim. Nutr. (Aberdeen) Tech. Commun. 8, 1937. 46 p.
454. Nyswander, D. B. Psychological factors associated with eating. *N. Y. J. Dent.*, 13: 10-14, 1943.

O

455. Oliver, D. A case of a change in food habits in Bougainville, British Solomon Islands. *Applied Anthropol.*, 1: 34-36, 1942.
456. Orenstein, A. J. The dietetics of natives employed on the Witwatersrand gold mines. *Africa*, 9: 218-224, 1936.
457. Orr, J. B. Food, health, and income; report on a survey of adequacy of diet in relation to income. 2nd ed. London, Macmillan, 1937. 82 p.
458. Orr, J. B. Problems of African native diet. Foreword. *Africa*, 9: 145-146, 1936.
459. Orr, J. B., and Gilks, J. L. Studies on nutrition, the physique and health of two African tribes. London, Privy Council, Med. Res. Council. Spec. Rept. Series No. 155, H. M. Stationery Off., p. 15-82, 1931.

Detailed account of field, laboratory, and hospital work.

460. Osborne, T. B., and Mendel, L. B. The choice between adequate and inadequate diets, as made by rats. *J. Biol. Chem.*, 35: 19-27, 1918.
461. O'Shea, H. E., Elsom, K. O'S., and Higbe, R. V. Studies of the B vitamins in the human subject: mental changes in experimental deficiency. *Am. J. Med. Sci.*, 203: 388-397, 1942.

P

462. Parker, G. The nutrition of Virginia people as indicated by the diets of school children. Va. Agr. Exp. Sta., Rural Soc. Rept., vol. 24, 1942. 72 p.
463. Passin, H. Culture change in Southern Illinois. *Rural Soc.*, 7: 303-317, 1942.
464. Passin, H., and Bennett, J. W. Changing agricultural magic in Southern Illinois: a systematic analysis of folk-urban transition. *Social Forces*, 22: 98-106, 1943.
465. Passin, H., and Bennett, J. W. Social process and dietary change. *In* The problem of changing food habits, p. 113-123. *See No. 6.*
See also No. 55.

H. Passin made an extensive anthropological study of food habits and the process of cultural change in Southern Illinois. *See* "The Problem of Changing Food Habits"⁶ for summary of work.

466. Patton, R. A., Karn, H. W., and King, C. G. Studies on the nutritional basis of abnormal behavior in albino rats. III. The effect of different levels of vitamin B₁ intake on convulsive seizures: the effect of other vitamins in the B-complex and mineral supplements on convulsive seizures. *J. Comp. Psych.*, 34: 85-89, 1942.
467. Pearl, R., and Fairchild, T. E. Studies on the physiology of reproduction in the domestic fowl. XIX. On the influence of free choice of food materials on winter egg production and body weight. *Am. J. Hyg.*, 1: 253-277, 1921.
468. Pelc, H., and Podzińková-Rieglová, M. A nutrition study of a Slavic agricultural family according to a record of the food consumption for one year. *Trav. Inst. Hyg. Pub. Tchecoslov.*, 5: 129-162, 1934.
469. Pfaffmann, C. Apparatus and technique for gustatory experimentation. *J. Gen. Psych.*, 12: 446-447, 1935.
470. Pfaffman, M. Teaching good food habits in a clinic. *Understanding the Child*, 11: 17-20, 1942.

471. Philip, C. R. Nutrition in Kenya: notes on the state of nutrition of African children. *E. Afr. Med. J.*, 20: 227-234, 1943.
472. Phillips, V., and Howell, E. L. Racial and other differences in dietary customs. *J. Home Econ.*, 41: 396-411, 1920.
473. Phillips, W. P. Economic factors in relation to adequate diets for school children in Cardiff. *Ann. Rept. Pub. Health Dept., City of Cardiff*, p. 148-152, 1937.
474. Pijoan, M. Food availability and social function. *New Mexico Quart. Rev.*, 12: 418-423, 1942.
475. Pijoan, M. Certain factors involved in the struggle against malnutrition and disease: with special reference to the Southwest of the United States and Latin America. *Inter-Americana VI*. Albuquerque, Univ. of New Mexico Press, 1943. 13 p.
476. Pijoan, M. The importance of a cultural approach in ameliorating nutritional defects in the Southwest. *In The application of anthropology to problems of nutrition and population*. Comm. on Food Habits, Nat. Res. Council, p. 13-22, 1944. Mimeographed.
477. Pijoan, M. Observations on the nutrition of Miskito Indians in Nicaragua. Ms. in preparation for publication.
478. Pijoan, M., and Elkin, C. A. Secondary anemia due to prolonged and exclusive milk feeding among Shoshone Indian infants. *J. Nutrition*, 27: 67-75, 1944.
479. Pijoan, M., Elkin, C. A., and Eslinger, C. O. Ascorbic acid deficiency among Papago Indians. *J. Nutrition*, 25: 491-496, 1943.
480. Pijoan, M., and Goubaud, A. Observations on food patterns and body economy in Canon de Taos. Univ. of New Mexico Press. In press.
481. Pijoan, M., and Lozner, E. L. The physiologic significance of vitamin C in man. *New Eng. J. Med.*, 231: 14-21, 1944.
482. Pijoan, M., and Lozner, E. L. Vitamin C economy in the human subject. *Johns Hopkins Hosp. Bull.*, 75: 303-314, 1944.
483. Pijoan, M., and Roskelley, R. W. Nutrition and certain related factors of Spanish-Americans in Northern Colorado. Denver, Rocky Mountain Council on Inter-American Affairs, 1943. 19 p.
See also Nos. 215, 282, 628.

M. Pijoan, as director of the U. S. Indian Service Nutrition Laboratory, Albuquerque, developed an approach, in collaboration with a group of anthropologists (Eggan and others), in which biological assays of nutritional status of people in the Southwest and studies of dietary practices were made; followed by an attempt to improve the diet by adding, if possible, foodstuffs familiar to the people and locally produced which also contain the necessary nutrients. Recognizes that if the energy level is extremely low from deficiencies, as it was in Indian-Spanish-American enclaves, it may be necessary to encourage the people to return to their previous diets until they acquire enough energy to make the most desirable change.

484. Pirkova-Jakobson, S., and Joffe, N. F. Some Central European food patterns and their relationship to wartime problems of food and nutrition. Czech and Slovak food patterns. Comm. on Food Habits, Nat. Res. Council. February 1943. 14 p. Mimeographed.
485. Pittman, M. S., McKay, H., Kunerth, B. L., Patton, M. B., Edelblute, N., and Cox, G. The caloric intakes of twenty-seven college women. *J. Am. Dietetic Assoc.*, 18: 449-453, 1942.
486. Platt, B. S. Economic Advisory Council. Committee on Nutrition in the Colonial Empire, First Report. London, H. M. Stationery Off., 1939.
487. Platt, B. S., and Gin, S. Y. Chinese methods of infant feeding and nursing. *Arch. Dis. Child.*, 13: 343-354, 1938.
488. Platt, W. Some fundamental assumptions pertaining to the judgment of food flavors. *Food Res.*, 2: 237-249, 1937.

489. Poe, C. F., Poe, E., and Muenzinger, K. F. The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. III. Vit. B₁. *J. Comp. Psych.*, 23: 67-76, 1937.
490. Poe, E., Poe, C. F., and Muenzinger, K. F. The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. I. The vitamin B-complex. *J. Comp. Psych.*, 22: 69-77, 1936.
491. Poe, E., Poe, C. F., and Muenzinger, K. F. The effect of vitamin deficiency upon the acquisition and retention of the maze habit in the white rat. IV. Vitamins B complex; B₁, and B₂ (G). *J. Comp. Psych.*, 27: 211-214, 1939.
492. Potgieter, M. The adequacy of diets of 38 Honolulu families on relief. *Hawaii Agr. Exp. Sta. Bull.* 94, 1944. 38 p.
493. Poull, L. E. The effect of improvement in nutrition on the mental capacity of young children. *Child Developm.*, 9: 123-126, 1938.
494. Powdermaker, H. Feasts in New Ireland: the social functions of eating. *Am. Anthropol.*, 34: 236-247, 1932.
495. Powdermaker, H. Summary of methods of a field work class cooperating with the Committee on Food Habits. In *The problem of changing food habits*, p. 95-96. See No. 6.
496. Preferences and practices in buying vegetables in Providence, Rhode Island. R. I. *Agr. Exp. Sta. Bull.* 220, 1929. 69 p.
497. Prentiss, S. W., and Jones, M. C. The observation of food habits in young children. *Childhood Educ.*, 7: 14-17, 1930.
498. Price, M., and Gallup, G. Food habits and home production and consumption of food, a study of 256 farm families in Preble and Harrison counties, Ohio, 1941. *Columbus, O. St. Univ., Coll. of Agr., Ext. Serv.*, 1942. 56 p.
499. Price, W. A. Calcium and phosphorus utilization in health and disease. Part II. *Certified Milk*, vol. 4, no. 43, 1929. 8 p.

R

500. Rahman, L., Richardson, H. B., Ripley, H. S. Anorexia nervosa with psychiatric observations. *Psychosom. Med.*, 1: 335-365, 1939.
501. Rainey, F. Native economy and survival in Arctic Alaska. *Applied Anthropol.*, vol. 1, no. 1, 1941.
502. Raper, A., and Tappan, P. W. Georgia sharecroppers: "Never too old to learn new tricks." *Applied Anthropol.*, 2: 3-11, 1943.
503. Raymond, C. Food customs from abroad. *Mass. Dept. Pub. Health*, no. 7051, April 1939. 16 p.
504. Read, M. Native standards of living and African culture change. *Africa*, vol. 11, no. 3, 1938. 56 p. Supplement.
505. Ready, M. E. Factors affecting choice of food in a cafeteria. *State Univ. of Iowa Library*, 1943. 36 p. M. A. thesis.
506. Reh, E. Diet and nutrition of the Papago Indians. Ms. in *Off. of Indian Affairs*, U. S. Dept. of Interior, 1943.
507. Remington, R. E. The social origins of dietary habits. *Sci. Monthly*, 43: 193-204, 1936.
508. Renaud, E. B. Influence of food on Indian culture. *Social Forces*, 10: 97-101, 1931.
509. Renner, H. D. *Origin of food habits*. London, Feber & Feber, 1944. 261 p.
510. Reynolds, E. A. The relation between dietary habits and health of children in rural sections of Virginia. *Va. Agr. Exp. Sta. Bull.* 250, 1926. 39 p.
511. Ribble, M. A. The significance of infantile sucking for the psychic development of the individual. *J. Nerv. Ment. Dis.*, 90: 455-463, 1939.
512. Rice, C. H. Relations of acquired food dislikes of childhood to diseases of middle life. *J. Am. Med. Assoc.*, 75: 100-102, 1920.
513. Rice, T. B. The emotional factor in nutrition. *Hygeia*, 22: 100-101, 1944.
514. Richards, A. I. *Hunger and work in a savage tribe; a functional study of nutrition among Southern Bantu*. London, Routledge, 1932. 238 p.

515. Richards, A. I. Land, labour and diet in Northern Rhodesia, an economic study of the Bemba tribe. New York, Macmillan; London, Oxford Univ. Press, 1939.
516. Richards, A. I., and Widdowson, E. M. A dietary study in North-eastern Rhodesia. Africa, 9: 166-196, 1936.

Both descriptive and quantitative records kept of native diet. Report includes discussion of acculturation problems.

517. Richardson, F. L. W., Jr. Indian peasants: thirty years of rural reconstruction. The experiences of Spencer Hatch in Travancore. Applied Anthropol., 2: 49-56, 1943.
518. Richardson, F. L. W., Jr. African tribesmen: everybody who's hungry can belong to my church. The work of S. B. Coles. Applied Anthropol., 2: 45-49, 1943.
519. Richter, C. P. Increased salt appetite in adrenalectomized rats. Am. J. Physiol., 115: 155-161, 1936.
520. Richter, C. P. Salt taste thresholds of normal and adrenalectomized rats. Endocrin., 24: 367-371, 1939.
521. Richter, C. P. Transmission of taste sensation in animals. Tr. Am. Neurol. Assoc., 65: 49-50, 1939.
See also No. 644.
522. Richter, C. P. Behavior and endocrine regulation of the internal environment. Endocrin., 28: 193-195, 1941.
523. Richter, C. P. Decreased carbohydrate appetite of adrenalectomized rats. Proc. Soc. Exp. Biol. Med., 48: 577-579, 1941.
524. Richter, C. P. Sodium chloride and dextrose appetite of untreated and treated adrenalectomized rats. Endocrin., 29: 115-125, 1941.
525. Richter, C. P. Physiological psychology. Ann. Rev. Physiol., 4: 561-574, 1942.
526. Richter, C. P. The self-selection of diets. Essays in biology, in honor of Herbert M. Evans. Univ. of Calif. Press, 1943, p. 499-506.
527. Richter, C. P., and Barelare, B., Jr. Nutritional requirements of pregnant and lactating rats studied by the self-selection method. Endocrin., 23: 15-24, 1938.
528. Richter, C. P., and Barelare, B., Jr. Further observations on the carbohydrate, fat and protein appetite of vitamin B deficient rats. Am. J. Physiol., 126: 607-608, 1939.
529. Richter, C. P., and Campbell, K. H. Sucrose taste thresholds of rats and humans. Am. J. Physiol., 128: 291-297, 1940.
530. Richter, C. P., and Campbell, K. H. Taste thresholds and taste preferences of rats for five common sugars. J. Nutrition, 20: 31-46, 1940.
531. Richter, C. P., and Eckert, J. F. Increased calcium appetite of parathyroidectomized rats. Endocrin., 21: 50-54, 1937.
532. Richter, C. P., and Eckert, J. F. Mineral appetite of parathyroidectomized rats. Am. J. Med. Sci., 198: 9-16, 1939.
533. Richter, C. P., and Hawkes, C. D. The dependence of the carbohydrate, fat and protein appetite of rats on the various components of the vitamin B complex. Am. J. Physiol., 131: 639-649, 1941.
534. Richter, C. P., Holt, L. E., Jr., and Barelare, B., Jr. Vitamin B₁ craving in rats. Science, 86: 354-355, 1937.
535. Richter, C. P., Holt, L. E., Jr., and Barelare, B., Jr. Nutritional requirements for normal growth and reproduction in rats studied by the self-selection method. Am. J. Physiol., 122: 734-744, 1938.
536. Richter, C. P., Holt, L. E., Jr., Barelare, B., Jr., and Hawkes, C. D. Changes in fat, carbohydrate and protein appetite in vitamin B deficiency. Am. J. Physiol., 124: 596-602, 1938.
537. Richter, C. P., and MacLean, A. Salt taste threshold of humans. Am. J. Physiol., 126: 1-6, 1939.

538. Richter, C. P., and Schmidt, C. H., Jr. Increased fat and decreased carbohydrate appetite of pancreatectomized rats. *Endocrin.*, 28: 179-192, 1941.

C. P. Richter, working in the Psychobiological Laboratory of Johns Hopkins Hospital, has developed an experimental technique for study of rats' self-selection of diets and influence of various physiological states on the selection.

539. Ridenour, N., and Williams, E. Balanced diets and balanced personalities. *Understanding the Child*, 11: 11-16, 1942.
540. Roberts, L. J. Children of pre-school age in Gary, Indiana. *In Diet of children. Part II*, p. 53-128. U. S. Dept. of Labor, Children's Bur. Pub. 122, 1922.
541. Roberts, L. J. The nutrition and care of children in a mountain county of Kentucky. U. S. Dept. of Labor, Children's Bur. Pub. 110, 1922. 41 p.
542. Roberts, L. J. The psychologists study eating habits. *Child Study*, 7: 35-38, 1929.
543. Roberts, L. J. Nutrition in Puerto Rico. *J. Am. Dietetic Assoc.*, 21: 298-304, 1944.
544. Roberts, W. O. Dakota Indians: successful agriculture within the reservation framework. *Applied Anthropol.*, 2: 37-44, 1943.
545. Robinson, W. D., Payne, G. C., and Calvo, J. A study of the nutritional status of a population group in Mexico City. *J. Am. Dietetic Assoc.*, 20: 289-297, 1944.
546. Rogerson, B. C. F., and Rogerson, C. H. Feeding in infancy and subsequent psychological difficulties. *J. Ment. Sci.*, 85: 1163-1182, 1939.
547. Rose, J. A. Eating inhibitions in children in relation to anorexia nervosa. *Psychosom. Med.*, 5: 117-124, 1943.
548. Rose, M. S. Racial food habits in relation to health. *Sci. Monthly*, 44: 257-267, 1937.
549. Roulx, L. L'alimentation en Haiti. *Bulletin du Service National d'Hygiene et d'Assistance Publique et Sanitaire*, no. 14. September 1937.
550. Ruch, F. L. Effect of inanition upon maze learning in the white rat. *J. Comp. Psych.*, 14: 321-329, 1932.

S

551. Sadow, S. E. Jewish ceremonials and food customs. *J. Am. Dietetic Assoc.*, 4: 91-98, 1928.
552. Sanford, R. N. The effects of abstinence from food upon imaginal processes. *J. Psych.*, 2: 129-136, 1936.
553. Sanford, R. N. The effects of abstinence from food upon imaginal processes: a further experiment. *J. Psych.*, 3: 145-159, 1937.
554. Santos, F. O., and Demeterio, J. K. Studies on the food of labourer's families in Macao, Leyte. *Philipp. Agriculturist*, 28: 15-24, 1939.
555. Saunders, J. L., and Taylor, R. M. S. The dental condition and diet of the Maoris of Maungapohatu Village. New Zealand Dept. of Health, Ann. Rept. of Director General, Append. C, 1936-1937, p. 64 and ff.
556. Saunders, L. A guide to materials bearing on cultural relations in New Mexico. School of Inter-American Affairs. Univ. of New Mexico Press, 1944.
557. Scantlebury, R. E., and Patterson, T. L. The effect of certain psychic phenomena on the various phases of gastric hunger contractions. *Am. J. Physiol.*, 123: 179-180, 1938.
558. Scheltema, A. M. P. A. The food consumption of the native inhabitants of Java and Madura. Batavia, Ruygrok & Co., 1936. 143 p.
559. Schmideberg, M. Intellectual inhibition and disturbances in eating. *Internat. J. Psycho-Analysis*, 19: 17-22, 1938.
560. Seay, M. F., and Meece, L. E. The Sloan experiment in Kentucky. *Bull. Bur. School Serv.*, vol. 16, no. 4, 1944. 131 p.
561. Self-selection of diets. *Nutrition Rev.*, 2: 199-203, 1944.
562. Selling, L. Malnutrition and the problem child. *Nervous Child*, 3: 187-194, 1944.
563. Shock, N. W. Physiological factors in behavior. *In* Hunt, J. McV., *Personality and the behavior disorders*. New York, Ronald Press, 1944, p. 582-618.

564. Shourie, K. L. A survey of diet and nutrition in Najafgarh, Delhi Province. *Indian J. Med. Res.*, 26: 907-920, 1939.
565. Siegal, E. H., Waugh, L. M., and Karshan, M. Dietary and metabolic studies of children with and without dental caries, including studies of metabolic balances of calcium, phosphorus, and nitrogen. *Am. J. Dis. Child.*, 59: 19-38, 1940.
566. Siegel, M., and King, M. Food habits of Spanish-Americans at Cundiyo, New Mexico. *Comm. on Food Habits, Nat. Res. Council*, 1943. Ms., 200 p.
567. Simmons, R. The relative effectiveness of certain incentives in animal learning. *Comp. Psych. Monogr.*, vol. 2, no. 7, 1924. 79 p.
568. Skinner, A. Material culture of the Menomine. IV. Food and its preparation. *Ind. Notes and Monogr.*, 20: 142-208, 1921. New York Mus. of the Am. Ind., Heye Found.
569. Skinner, B. F. The behavior of organisms: an experimental analysis. New York, Appleton-Century, 1938. 457 p.
570. Skinner, B. F. A method of maintaining an arbitrary degree of hunger. *J. Comp. Psych.*, 30: 139-145, 1940.
571. Sladden, D. E. Transference of induced food-habit from parent to offspring. Part I. *Proc. Roy. Soc. London*, 114B: 441-449, 1933.
572. Sladden, D. E., and Hewer, H. R. Transference of induced food-habit from parent to offspring. III. *Proc. Roy. Soc. London, Series B*, 126: 30-44, 1938.
573. Slonaker, J. R. The effect of a strictly vegetable diet on the spontaneous activity, the rate of growth, and the longevity of the albino rat. *Leland Stanford Jr. Univ. Pub.*, 1912.
574. Smith, A. J., and Field, A. A study of the effect of nutrition on mental growth. *J. Home Econ.*, 18: 686-690, 1926.
575. Smith, W. H. and E. M. Native diet in Zanzibar. *E. Africa Med. J.*, 12: 246-251, 1935.
576. Spezzafumo, O. Enquête sur l'alimentation dans la population italienne ouvrière de Tunis. *Arch. Inst. Pasteur Tunis*, 29: 113-125, 1940.
577. Spock, B. The occasions when feeding problems begin. *Nervous Child*, 3: 162-164, 1944.
578. Stamm, E. K., and Wiehl, D. G. Medical evaluation of nutritional status. VIII. The school lunch as a method for improving diets of high school students. *Milbank Mem. Fund Quart.*, 20: 83-96, 1942.
579. Standards for interpretation of dietary surveys. *Nutrition Rev.*, 2: 264-266, 1944.
580. Stefansson, V. Food tastes and food prejudices of men and dogs. *Sci. Monthly*, 11: 540-543, 1920.
581. Stefansson, V. Adventures in diet. *Harpers*, 171: 668-675, 1935; 172: 46-54, 178-189, 1936.
582. Stefansson, V. Food of ancient and modern stone age man. *J. Am. Dietetic Assoc.*, 13: 102-119, 1937.
583. Stefansson, V. Pemican. *Mil. Surgeon*, 95: 89-98, 1944.
584. Steggerda, M., and Eckardt, R. B. Navajo foods and their preparation. *J. Am. Dietetic Assoc.*, 17: 217-221, 1941.
585. Stellar, E. The effect of epinephrine, insulin, and glucose upon hoarding in rats. *J. Comp. Psych.*, 36: 21-32, 1943.
586. Stellar, E., and Morgan, C. T. The roles of experience and deprivation in the onset of hoarding behavior in the rat. *J. Comp. Psych.*, 36: 47-55, 1943.
587. Stene, J. A., and Roberts, L. J. A nutrition study on an Indian reservation. *J. Am. Dietetic Assoc.*, 3: 215-222, 1928.
588. Sterba, E. An important factor in eating disturbances of childhood. *Psychoanalytic Quart.*, 10: 365-372, 1941.
589. Stern, F. The nutritionist looks at mental hygiene. *Ment. Hyg.*, 14: 54-66, 1930.
590. Stevens, H. Avitaminosis B (B_1), maze performance, and certain aspects of brain chemistry. *J. Comp. Psych.*, 24: 441-458, 1937.
591. Stevenson, H. N. C. Feasting and meat division among the Zahau Chins of Burma: a preliminary analysis. *London, J. Roy. Anthropol. Inst.*, 67: 15-32, 1937.

592. Stiebeling, H. K., Monroe, D., Coons, C. M., Phipard, E. F., and Clark, F. Family food consumption and dietary levels: five regions. *Consumer Purchases Study, Farm Series*, U. S. Dept. of Agr. Misc. Pub. 405, 1941. 393 p.
593. Stiebeling, H. K., Monroe, D., Phipard, E. F., Adelson, S., and Clark, F. Family food consumption and dietary levels: five regions. *Consumer Purchases Study, Urban and Village Series*, U. S. Dept. of Agr. Misc. Pub. 452, 1941. 268 p.
594. Stiebeling, H. K., and Munsell, H. E. Food supply and pellagra incidence in 73 South Carolina farm families. *U. S. Dept. of Agr. Tech. Bull.* 333, 1932. 36 p.
595. Stiebeling, H. K., and Phipard, E. F. Diets of families of employed wage earners and clerical workers in cities. *U. S. Dept. of Agr. Cir.* 507, 1939. 141 p.
596. Stone, C. P. A simple method for developing olfactory discrimination habits in rats. *J. Genet. Psych.*, 58: 419-421, 1941.
597. Sullivan, R. J. *The Ten'a food quest*. Washington, D. C., Catholic Univ. of Am. Anthropol. Series 11, 1942. 142 p.
598. Sweeny, M. Changing food habits. *J. Home Econ.*, 34: 457-462, 1942.
599. Sweetman, M. D. The scientific study of the palatability of food. *J. Home Econ.*, 23: 161-172, 1931.

T

600. Thurston, F. M. A preliminary study of the factors affecting the time taken by nursery school children to eat their food. *J. Genet. Psych.*, 36: 303-318, 1929.
601. Titiev, M. Hopi method of baking sweet corn. *Papers Mich. Acad. Sci., Arts and Letters*, 23: 87-94, 1937.
602. Tomhave, A. E., and Mumford, C. W. Self-selection of feeds by hens. *Del. Agr. Exp. Sta. Bull.* 174, 1931.
603. Tsang, Yu-Chuan. Hunger motivation in gastrectomized rats. *J. Comp. Psych.*, 26: 1-17, 1938.
604. Turlay, M. E. A survey of the diets of West Coast industrial workers. *J. Am. Dietetic Assoc.*, 19: 567-569, 1943.
605. Turner, C. E. Significant findings of the Massachusetts high school study and their implications for health education programs. *J. School Health*, 13: 9-17, 1943.
606. Tussing, L. A study of sex differences in food likes and dislikes. *Proc. Ind. Acad. Sci.*, 48: 198-199, 1939.

U

607. United States Department of Agriculture. *Family food consumption in the United States*, Spring, 1942. Misc. Pub. No. 550, 1944. 157 p.
608. United States Department of Agriculture. *National wartime food guide*. NFC 4 Revised, July 1944. 8 p.
609. United States Department of Agriculture, War Food Admin. *A brief review of food and nutrition in five countries*. 1943. 28 p.
610. United States Department of Agriculture, War Food Admin. *Democracy means all of us: how communities can organize to study and meet community needs with special suggestions for developing nutrition programs in wartime*. August 1943. 30 p.
611. United States Department of Agriculture, War Food Admin. *Food consumption levels in the United States, Canada, and the United Kingdom*. 1944. 21 p.

V

612. Vance, T. F. Food selections of nursery school children. *Child Developm.*, 3: 169-175, 1932.
613. Vance, T. F., and Temple, V. M. The food preferences of preschool children: a comparison of rural children with children of the Iowa State College nursery school. *Child Developm.*, 4: 222-228, 1933.
614. Vaughan, W. T. Why we eat what we eat. *Sci. Monthly*, 50: 148-154, 1940.

- 615. Viek, P., and Miller, G. A. The cage as a factor in hoarding. *J. Comp. Psych.*, 37: 203-210, 1944.
- 616. Vitamins and fatigue. *Nutrition Rev.*, 1: 227-229, 1943.
- 617. Vitamins and physical fitness. *Nutrition Rev.*, 2: 115-117, 1944.
- 618. Vitamin B-complex and hard work. *Nutrition Rev.*, 2: 334-336, 1944.

W

- 619. Wald, G., and Steven, D. An experiment in human vitamin A deficiency. *Am. J. Physiol.*, 126: 648, 1939.
- 620. Wallen, R. Sex differences in food aversions. *J. Appl. Psych.*, 27: 288-298, 1943.
- 621. Waller, J. V., Kaufman, R. M., and Deutsch, F. Anorexia nervosa: a psychosomatic entity. *Psychosom. Med.*, 2: 3-16, 1940.
- 622. Walter, D. H. Sources of food and some factors affecting consumption in the borough of State College, Pennsylvania. *Pa. Agr. Exp. Sta. Tech. Paper* 601, 1933. 34 p.
- 623. Warden, C. J., and Jackson, T. A. A preliminary study of the hunger drive in the Rhesus monkey. *J. Genet. Psych.*, 46: 126-218, 1935.
- 624. Warkentin, J., Warkentin, L., and Ivy, A. C. The effect of experimental thyroid abnormalities on appetite. *Am. J. Physiol.*, 139: 139-146, 1943.
- 625. Warner, L. H. A study of hunger in the white rat by means of the obstruction method. *J. Comp. Psych.*, 8: 273-299, 1928.
- 626. Watson, J. B. A study of nutritional problems among the Hopi. Ms. in Off. of Indian Affairs, U. S. Dept. of Interior.
- 627. Watson, J. B. How the Hopi classify their foods. *Plateau*, 15: 49-52, 1943.
- 628. Watson, J. B., and Pijoan, M. Hopi foodways. Ms. in Off. of Indian Affairs, U. S. Dept. of Interior. 1943. 204 p.
- 629. Waugh, F. W. Iroquois foods and food preparation. *Geol. Survey of Can., Mem.* 86, 1916.
- 630. Wentworth, K. L. The effect of a native Mexican diet on learning and reasoning in white rats. *J. Comp. Psych.*, 22: 255-267, 1936.
- 631. Whitacre, J. The diet of Texas school children. *Texas Agr. Exp. Sta. Bull.* 489, 1931. 44 p.
- 632. Whitacre, J. The food supply of Texas rural families. *Texas Agr. Exp. Sta. Bull.* 642, 1943. 40 p. Also see Bull. 643, 1943, by the same author.
- 633. Wiehl, D. G. Diets of low-income families in New York City. *Milbank Mem. Fund Quart.*, 11: 308-324, 1933.
- 634. Wiehl, D. G. Diets of low-income families in Cleveland, Detroit, and Syracuse. *Milbank Mem. Fund Quart.*, 12: 35-46, 1934.
- 635. Wiehl, D. G. Diets of urban families with low incomes. *Milbank Mem. Fund Quart.*, 12: 343-369, 1934.
- 636. Wiehl, D. G. Diets of low income families surveyed in 1933. *U. S. Pub. Health Repts.*, 51: 77-97, 1936.
- 637. Wiehl, D. G. Diets of a group of aircraft workers in Southern California. *Milbank Mem. Fund Quart.*, 20: 329-366, 1942.
- 638. Wiehl, D. G. Medical evaluation of nutritional status. VII. Diets of high school students of low-income families in New York City. *Milbank Mem. Fund Quart.*, 20: 61-82, 1942.
- 639. Wiehl, D. G. Medical evaluation of nutritional status. XV. Caloric intake of high school students in New York City. *Milbank Mem. Fund Quart.*, 22: 5-40, 1944.
- 640. Wiehl, D. G., and Palmer, C. E. Summer diets of the poor in Washington, D. C. *Milbank Mem. Fund Quart.*, 17: 5-28, 1939.
- 641. Wilder, C. E. Selection of rachitic and anti-rachitic diets in the rat. *J. Comp. Psych.*, 24: 547-577, 1937.
- 642. Wilder, J. Malnutrition and mental deficiency. *Nervous Child*, 3: 174-186, 1944.
- 643. Wilder, R. M. Role of nutritional deficiency in nervous and mental disease; symptoms and signs of thiamine deficiency. *Assoc. Res. Nerv. Ment. Dis., Proc.*, 22: 101-112, 1943.

644. Wilkins, L., and Richter, C. P. A great craving for salt by a child with cortico-adrenal insufficiency. *J. Am. Med. Assoc.*, 114: 866-868, 1940.
645. Willerman, B. Group decision and request as means of changing food habits. *Comm. on Food Habits, Nat. Res. Council*. April 1943. 11 p. Mimeographed.
646. Williams, F. M., Stiebeling, H. K., Swisher, I. G., and Weiss, G. S. Family living in Knott County, Kentucky. *U. S. Dept. of Agr. Tech. Bull.* 576, 1937. 69 p.
647. Williams, F. M., and Zimmerman, C. C. Studies of family living in the United States and other countries: an analysis of material and methods. *U. S. Dept. of Agr. Misc. Pub. No. 223*, 1935. 617 p.

Is an annotated bibliography with key to material and method, indicating studies which include data on food consumption and nutritive content of diet; complete for entire world.

648. Williams, R. D., Mason, H. L., Cusick, P. L., and Wilder, R. M. Observations on induced riboflavin deficiency and the riboflavin requirement of man. *J. Nutrition*, 25: 361-377, 1943.
649. Wilson, C. The diets of Hartford school children. *Hartford, Bd. of Educ.*, 1941. Mimeographed.
650. Wilson, D. C., and Widdowson, E. M. A comparative nutritional survey of various Indian communities. *Ind. Med. Res. Mem. No. 34*, March 1942. 119 p.
651. Winters, J. C. A report on the health and nutrition of Mexicans living in Texas. *Texas Univ. Bur. Res. in the Soc. Sci., Study No. 2*, *Texas Univ. Bull.* 3127, 1931. 99 p.
652. Winters, J. C., and Leslie, R. E. A study of the diet of 20 women in a moderate income group. *J. Nutrition*, 27: 185-192, 1944.
653. Wolbach, S. B., and Bessey, O. A. Vitamin A deficiency and the central nervous system. *Am. J. Path.*, 17: 586, 1941.
654. Wolf, A. W. M. Understand emotions to improve nutrition. *Understanding the Child*, 11: 21-24, 1942.
655. Wolfe, J. B. An exploratory study of food-storing in rats. *J. Comp. Psych.*, 28: 97-108, 1939.
656. Wolfle, D. L., and Wolfle, H. M. The development of cooperative behavior in monkeys and young children. *J. Genet. Psych.*, 55: 137-175, 1939.
657. Wood, L. Food likes and dislikes of forty-eight children as studied in a nursery school for fifty-four weeks. *In The pre-school child: his development and his guidance: a conference held at Mills College, Calif., April 6, 7, and 8, 1928. Oakland, Mills Coll. Bull. Series 18, no. 6*, 1928. 172 p.
658. Woodbury, R. M. Food consumption and dietary surveys in the Americas. *Montreal, Internat. Lab. Off.*, 1942. 64 p.
659. Woods, C. D., and Mansfield, E. R. Studies of the food of Maine lumbermen. *U. S. Dept. of Agr., Off. of Exp. Sta. Bull.* 149, 1904. 60 p.
660. Woodward, P. Attitudes toward the use of soybeans as food. *Comm. on Food Habits, Nat. Res. Council*. October 1943. 11 p. Mimeographed.
See also No. 309.

Has written other reports, a partial list of which appears in "The Problem of Changing Food Habits"; a complete list can be obtained from the Committee office. ✓

661. Woodward, P. The relative effectiveness of different combinations of appeals in presenting a new food—soya. To be published.
662. Worthington, E. B. On the food and nutrition of African natives. *Africa*, 9: 150-165, 1936.
663. Wright, M. D. The Oslo meal: its acceptability among industrial workers. *J. Roy. Inst. Pub. Health & Hyg.*, 3: 3-8, 1940.

Y

664. Yamashita, T. Studies on fundamental habits in early childhood. I and II. *Kyoiku*, 4: 648-672, 1936; 5: 93-110, 1937.

665. Youmans, J. B., Patton, E. W., and Kern, R. Survey of the nutrition of populations. Description of population, general methods and procedures, and findings in respect to energy principle (calories) in rural population in middle Tennessee. *Am. J. Pub. Health*, 33: 58-72, 1943.
666. Youmans, J. B., Patton, E. W., Sutton, W. R., Kern, R., and Steinkamp, R. Surveys of the nutrition of populations. 2. The protein nutrition of a rural population in middle Tennessee. *Am. J. Pub. Health*, 33: 955-964, 1943.
667. Young, A. A method for the evaluation of a community nutrition program. *J. Am. Dietetic Assoc.*, 19: 420-427, 1943.
668. Young, E. G. A dietary survey in Halifax. *Canad. Pub. Health J.*, 32: 236-240, 1941.
669. Young, P. T. Studies in affective psychology. VI. Preferential discrimination of the white rat for different kinds of growth. *Am. J. Psych.*, 40: 372-394, 1928.
670. Young, P. T. Relative food preferences of the white rat. *J. Comp. Psych.*, 14: 297-319, 1932.
671. Young, P. T. Relative food preferences of the white rat. II. *J. Comp. Psych.*, 15: 149-165, 1933.
672. Young, P. T. Food preferences and the regulation of eating. *J. Comp. Psych.*, 15: 167-176, 1933.
673. Young, P. T. Preferences and demands of the white rat for food. *J. Comp. Psych.*, 26: 545-589, 1938.
674. Young, P. T. Reversal of food preferences of the white rat through controlled pre-feeding. *J. Gen. Psych.*, 22: 33-66, 1940.
675. Young, P. T. The experimental analysis of appetite. *Psych. Bull.*, 38: 129-164, 1941.
676. Young, P. T. *Emotion in man and animal*. New York, John Wiley & Sons, Inc., 1943. p. 125-155.
677. Young, P. T. Food preferences, food habits, and appetites of the rat. *In Research on appetite levels*. Comm. on Food Habits, Nat. Res. Council. February 1944, p. 47-54. Mimeographed.
678. Young, P. T., and Wittenborn, J. R. Food preferences of rachitic and normal rats. *J. Comp. Psych.*, 30: 261-277, 1940.

P. T. Young, as an experimental psychologist, has developed and used techniques for studying appetite experimentally, including animals' preferences for different foods, and the influence of numerous variables such as relative positions of foods, physiological need for a food, use or non-use of head receptors in the choice situation, on the choice of food.

Z

679. Zayaz, S. L., Mack, P. B., Sprague, P. K., and Bauman, A. W. Nutritional status of school children in a small industrial city. *Child Developm.*, 11: 1-25, 1940.
680. Ziegler, L. H., and Knudson, A. Quantitative analysis of activity after recovery from rickets: an experimental study. *J. Comp. Psych.*, 24: 119-126, 1937.
681. Zimmerman, H. M. The pathology of the nervous system in vitamin deficiencies. *Yale J. Biol. & Med.*, 12: 23-28, 1939.
682. Zimmerman, H. M., and Cowgill, G. R. Lesions of the nervous system in vitamin deficiency. IV. The effect of carotene in the treatment of the nervous disorder in rats fed on a diet low in vitamin A. *J. Nutrition*, 11: 411-423, 1936.

PARTIAL INDEX TO ALPHABETICAL BIBLIOGRAPHIES

I. SOME REGIONAL STUDIES *

AMERICA 658

Canada 213, 214, 258, 298, 366, 611, 668

Central America 51, 98, 253, 477

The Indians of North America

Canada 70, 293

Eskimos 501, 565, 583

United States 36, 103, 106, 107, 108, 155, 160, 282, 478, 479, 506, 508, 544,
568, 584, 587, 597, 601, 626-9

Mexico 50, 246, 347, 545, 609

South America

Brazil 109

Colombia 51

Chile 378

West Indies

Cuba 105

Haiti 549

Puerto Rico 176, 434, 543

EUROPE 14, 414

Czechoslovakia 326, 414, 468, 484

Germany 175

Great Britain 85, 110-3, 116, 123-7, 206, 219, 356, 453, 457, 486, 611, 663

Hungary 264, 306, 414

Italy 449

Netherlands 414, 609

Poland 54, 381, 414

Scandinavia 69, 414

ASIA 11

China 11, 117-8, 143, 335, 345, 346, 350-1, 487, 609

India and Ceylon 11, 169, 247, 255, 287, 345, 357-8, 382, 416, 448, 517, 564, 609, 650

Indo-China 11

Burma 11, 345, 591

Siam 11

Indonesia 11, 190, 230, 345, 558

Japan 11, 345, 664

Korea 73, 345

Syria 189

AFRICA

Egypt 609

Primitive Societies 34, 158, 229, 233, 284, 374, 458-9, 471, 504, 514-6, 518, 575, 662

Tunis 576

Union of South Africa 132, 456

* No attempt has been made for geographic inclusiveness but references selected for methodological reasons are here arranged geographically for the convenience of the research worker.

AUSTRALIA AND NEW ZEALAND

New Zealand 261, 373

Maoris 555

PACIFIC ISLANDS 11

Hawaiian Islands 48, 223, 410, 492*Philippine Islands* 11, 267, 554*Primitive Societies* 97, 207, 374, 376, 393, 455, 494

2. STUDIES WITHIN THE UNITED STATES.

7, 25, 30, 159, 269, 332, 592-5, 607, 611, 620, 635-6, 647

a. REGIONAL

NORTHEASTERN STATES

Middle Atlantic

District of Columbia 640

Maryland 99, 134, 204

New York 82, 89, 100, 177, 203, 252, 283, 324, 327, 361-2, 422, 445, 493, 578, 600, 633-4, 638-9

Pennsylvania 67, 154, 291, 367-9, 622, 679

New England 315

Connecticut 122, 268, 319, 649

Maine 129-31, 194, 198-9, 202, 435, 659

Massachusetts 170, 216

Rhode Island 328-9, 496

Vermont 84, 283, 348, 439

SOUTH 316

South Atlantic

Georgia 166, 359, 389, 502

North Carolina 166, 406, 410

South Carolina 166, 236-7, 426-8, 594

Virginia 510

South Central

Alabama 35, 66, 574

Kentucky 83, 325, 541, 560, 646

Mississippi 180-7

Tennessee 72, 334, 665-6

NORTH CENTRAL 191

Northwest

Iowa 227, 341-3, 442, 505, 612-3, 645

Kansas 336, 485

Minnesota 212, 336, 643, 648

Nebraska 337, 375

Old Northwest

Illinois 55-7, 68, 271, 463-5

Indiana 301, 540, 606

Michigan 101, 249, 277

Ohio 269, 370-2, 485, 498, 634

Wisconsin 156-7, 288

OLD SOUTHWEST

Louisiana 96, 133, 263

Oklahoma 260

Texas 205, 244, 631-2, 651-2

FAR WEST

Northwest

Washington 218

Southwest

California 45, 74, 75, 497, 604, 637, 657

Colorado 483

New Mexico 106, 251, 349, 474-6, 480, 556, 566

Utah 86-8

b. ETHNIC GROUPS

31, 304, 352, 472, 503

Chinese-Americans 281, 302

Czech and Slovak-Americans 484

Hungarian-Americans 306

Italian-Americans 31, 167, 319, 430, 445, 449

Jewish-Americans 104, 338, 551

Mexican-Americans 31, 651

Negro-Americans 31, 35, 71, 310, 406

Polish-Americans 31, 54, 431

3. THEORETICAL ARTICLES

33, 40, 57, 94, 126, 153, 161, 174, 192, 198, 199, 207, 215, 220, 229, 233, 240, 246, 259, 280, 294, 312, 313, 333, 341, 347, 376, 385, 397-405, 421, 464, 474, 504, 507, 509, 513-6, 547, 548, 589, 598, 614, 662, 675

4. PSYCHOSOMATIC STUDIES

27-9, 90-3, 95, 135, 153, 179, 208-10, 220, 238, 242, 286, 304, 355, 387, 408, 454, 500, 512, 513, 547, 559, 589, 621, 656

5. STUDIES OF CHILDREN

12, 37, 58, 65, 67, 68, 89, 90-3, 101, 120, 178, 207, 212, 216, 240, 243, 254, 286, 331, 355, 359, 361-2, 408, 437, 444, 454, 470, 487, 497, 512, 539, 542, 546, 547, 562, 577, 588, 600, 612, 613, 642, 654, 657, 664

WITH SPECIAL REFERENCE TO CHILDREN'S DIETS

129, 133, 170, 244, 277, 329, 371, 435, 462, 510, 540

6. METHODS *

a. SOME OBSERVATIONAL METHODS

Analysis of verbatim material, such as interviews and essays 123-7, 309, 409, 660

Attitude tests 83

Check-lists 202, 269, 283, 606, 620

Diet histories 271, 372

Diet records 4, 50, 82, 180, 236, 428

Evaluations of some observational techniques 295, 579

Grocery sales slips 282, 367, 442

* Only some studies which are representative of the various types of methods are listed here.

Interviews 92-3, 179, 184, 237, 341, 359, 360
 Observations of choice of food 288, 612, 613, 661
 Observations of reactions to food 212, 250, 308, 413
 Projective methods 339, 342, 553
 Quantitative measurements of food 25, 410, 422, 516
 Questionnaires 96, 237, 328, 496
 Rating scales 68, 101, 216, 361-2, 497

b. SOME EXPERIMENTAL METHODS

Influence of social and emotional conditions on animals' behavior toward food
 Emotional 78, 248, 344, 387, 417, 557
 Social 44, 265, 273, 274, 429, 446, 450
 Methods of changing animals' food preferences 278, 674, 677
 Methods of changing food choices of people 47, 211, 250, 292, 340, 341, 343, 354, 379, 505, 645
 Methods of studying deficient animals' ability to select nutritionally desirable food mixture from several 276, 311, 641, 678
 Methods of studying degree of hunger 77, 79-80, 228, 285, 339, 377, 552, 569-70, 623, 625
 Methods of testing animals' food preferences 200, 239, 596, 670, 671, 673
 Self-selection of diets 128, 171, 195, 535, 561
 Studies of effect of deprivation on animals' behavior toward food 226, 296, 364, 412, 425, 586, 615
 Studies of effect of nutritional status on learning ability and performance
 Learning of animals 59-61, 62, 241, 303, 390-2, 489-91
 Learning of children 243, 258, 275, 574
 Performance 188, 318, 616-8
 Studies of food and taste preferences of human beings 20, 314, 330, 418
 Studies of influence of previous experience on animals' selection of diet 276, 311, 677, 678

7. BIBLIOGRAPHIES

31, 175, 242, 374, 556, 647

INDEX

- Action, basis for, 26
- Aged, 16, 23, 39, 81, 83
- Agriculture, 31
- Agronomist, 16, 17
- Alcohol, 63, 68, 71
 - alcoholism, 45
- Allee, 76, 77
- Allergies, 23, 45
- Americans, 23, 34, 35, 48
- Animals
 - ability to select, 61, 62, 63, 65-69
 - abnormal behavior, 79, 80
 - adrenalectomy, 62
 - control, 61, 70, 72, 73, 79, 91
 - education of, 67
 - experiments, 61, 65-67, 70, 72-79
 - feeding, 91
 - how change, 84, 90
 - internal environment, 62
 - maze learning, 91, 92
 - nutritional instinct, 62
 - parathyroidectomy, 62
 - social behavior, 76-79
 - social organization, 77, 78
- Anthropology, 14, 18, 23, 27, 48, 57
- Appetites, 42, 46, 61, 63, 66, 69, 70, 71, 83, 90
- Arthur Performance Scale, 92
- Attitudes
 - adult, 42
 - deviant, 44
 - dynamics of, 48
 - early, 56, 84
 - general, 13, 40
 - hunger, 82
 - interviews used, 57
 - local, 50
 - parental, 43
 - population, 49
 - public, 17
 - regional, 41
 - verbatim, 88
 - waste, 36, 37
 - See also* Cultural
- Autistic process, 82
- Availability, 16, 64, 85
- Balken, 92
- Bavelas, 89
- Bayer, 69, 71, 76
- Bayroff, 77
- Bennett, 48, 57
- Bernard, Claude, 62
- Biel, 91
- Biochemistry, 14, 15, 16, 17, 36, 91
- Bodily practices, 26, 56, 79
- Bousfield, 79, 81
- Breen, 83
- Bruch, Hilde, 27, 57
- Bunch, 80
- Bureau of Human Nutrition and Home Economics, 35
- Cafeteria studies, 16, 86, 87, 88, 89
- California, 41
- Canada, 39
- Canalization, 66, 85
- Cats, 75
- Cedar Rapids study, 41, 48, 49
- Chaney, 83
- Chein, 82
- Chemistry, 14, 63, 91
- Chicks, 36, 61, 65, 68, 69, 81
- Children
 - care of, 34
 - food choices, 15, 16, 38, 41, 64, 86
 - free choices, 63
 - obese, 27
 - school, 19, 32, 41, 49, 87
 - statements, 38, 56
 - training, 13, 27, 40, 43, 44, 45
 - See also* Nursery schools, Infants
- Chimpanzees, 77, 78
- Chinese, 27
- Clark, 62
- Classification of, 41
- Class typing, 34, 38
- Clausen, 62
- Committee on Food Habits, 3, 4, 57
- Community study, 89
- Competition, 77, 78, 79
- Conditioning, 79, 80, 81, 91
- Consumption, post war, 36, 43
 - studies, 34, 35, 36, 39, 55, 58
- "Context for the Collection of Data," 27
- Cooking, 33, 34, 40, 43
- Cows, 61
- Crawford, 77
- Cultural
 - classification, 41
 - consistencies of, 58
 - context, 49
 - data, 19, 44
 - food use, 37
 - frame, 48
 - limited concept, 42

- method, 27
- pattern, 17
- personal, 40
- pressures, 13
- principles, 25
- restaurants, 50
- varieties of, 24
- Cussler, Margaret T., 47, 56
- Data, 13, 15, 18, 19, 26, 93
 - basic, 23, 24
 - concrete, 27, 28
 - core of, 51
 - identification, 26
- Davis, 63, 83
- Deficiency, 75, 76, 90, 92
 - See also* Vitamins
- Definition of study, 13
- De Give, Mary L., 47, 56
- De Haan, Bierens, 70
- Democracy, 25
- Deprivation, 70, 73-81, 91
 - relative, 72
- Deutsch, 45
- Diet
 - army, 17
 - balanced, 62, 63
 - changes in, 14, 34, 48
 - choices, 64
 - evaluation of, 31
 - history, 55
 - McCollum, 62, 63
 - Mexican, 91
 - predetermined, 61
 - Sikhs, 91
 - standard, 38, 61
 - uncertainties of, 31
- Dietary laws, 39, 42
- Diseases, 16, 23, 45, 57, 63, 64
 - Addisons', 63
 - tuberculosis, 89
- Dish washing, 37
- Disposal of waste, 36, 37
- Distribution of food, 13, 26, 31, 33, 34, 37, 39
- Division of labor, 37
- Dogs, 36, 67, 79, 92
- Dominance, 76, 78, 86
- Dove, 57, 61, 68, 70, 77, 83
- Drug addicts, 45
- Dunker, 86
- Economics, 14, 16, 17, 35, 39
- Economist, 36, 48
- Education, 13, 14, 15
 - material used, 88
 - of rats, 67
 - programs, 23, 46
 - results of, 67, 68
 - system of, 25
 - See also* Learning
- Elder, 70
- Electricity used, 80
- Elimination pattern, 43
- Elliott, 81
- Emotional elements, 78, 79, 85
- Employment, 31, 34, 37
- Environment, 13, 14, 25, 61, 62
- Epinephrine, 75
- Ethics, 17
- Ethnic, 34
- Ethnologist, 18
- Etiquette, 40
- Expectancy, 84
- Experimental studies, 27, 50, 62, 66, 69, 70-79, 84, 85, 87, 93
- Experiments, 19, 24, 26, 50, 58, 61, 64, 69, 74-80, 81, 82, 85, 90
- Exploratory tests, 51, 57, 73
- Family, 27, 32, 34
- Fatigability, 17, 48
- Fertilizer, 14, 28, 31
- Festinger, 72
- Finan, 81
- Fitts, 81
- Flexibility, 13, 17, 25, 57
- Folk lore, 38, 39
- Food
 - apportionment, 39
 - available, 16, 23, 36
 - chart, 15
 - choice, 61-64, 67, 69, 71, 72, 82, 86
 - concrete, 55
 - control, 15, 61, 79
 - drive, 78, 80
 - edible, 41
 - enrichment of, 16
 - evaluation, 23
 - good for us, 88
 - ideals, 35
 - intake, 55, 56, 62, 63, 64, 75
 - meaning of, 86
 - natural, 25, 61, 70
 - new, 14, 23, 39, 40, 46, 47, 88
 - practice, 56
 - prefeeding, 71
 - quantitative studies, 31, 35
 - rejections of, 15, 24, 36, 40, 67, 85
 - religion in, 39
 - repetition of, 67, 85
 - satiation, 71-74, 76-78, 81, 84
 - seasonal, 24, 35
 - sharing, 77, 78
 - strange, 55, 85
 - "together," 72
 - unfamiliarity, 66, 69

- unit of study, 25
- See also* Palatability, Social status
- Food, patterns of eating, 16, 35, 36
 - cafeteria, 16, 86
 - holidays, 39
- "Food furnished," 33
- Food locker, 32
- Food pathology
 - anorexia nervosa, 45
 - asthma, 45
 - cults and fads, 44, 45
 - See also* Magical use of diet
- Foods used
 - alfalfa, 65, 68
 - baby, 38
 - beverages, 31, 36
 - bread and flour, 15, 16, 24, 32, 33, 37, 38, 40, 42, 69, 77, 79, 83, 87, 89
 - cake, 32, 34
 - carbohydrates, 62
 - caseinogen, 61
 - cereal and grain, 31, 36, 71, 72
 - cod liver oil, 64
 - coloring of, 83
 - eggs, 87
 - fats, 62
 - feminine, 38
 - fish, 33, 37, 39
 - flavoring, 65, 66, 68, 69, 83
 - fruits, 36, 57, 70, 77, 79, 86
 - leftovers, 36, 72, 85
 - meat, 25, 32, 38, 44, 47, 89
 - milk, 25, 33, 36, 72, 85
 - oil, 62, 66, 68
 - oysters, 65
 - salt, 61, 62, 63
 - sodium, 62
 - soy soup, 23
 - soya, 88
 - sweets, 38, 61, 62, 63, 65, 69, 70, 71, 72, 79, 83, 85
 - vegetables, 15, 16, 31, 32, 34, 65, 70, 82, 83
 - water, 63, 67, 89, 90
 - wine, 42
 - yeast, 63, 67
- Foodways, 14, 16, 27, 28, 31, 47, 48, 57
- French, 69
- Fritz, 92
- Frustration, 75, 76, 78
- Gantt, 79
- Garbage, 36, 37
- Gardens, 32
- Gauger, 85
- Genetics, 14, 15, 16, 31
- Germans, 25, 27
- Gillett, 89
- Glucose, 75
- Government reports, 31
- Great Britain, 15, 34, 39
- Group decisions, 89, 90
- Guhl, 76, 77
- Habits, 82
 - changing, 14-19, 24, 26, 41, 45, 80, 84, 85, 86, 88, 89, 90, 92
 - concepts, 42, 45
 - dynamics, 46
 - flexibility, 17, 25
 - good or bad, 13, 14, 42
 - how change, 24, 25, 26
 - inflexible, 14, 24
 - parental training, 43
 - preferential, 69
 - study of defined, 13, 16, 17
 - traditional, 13, 14
 - unit of study, 25
- Harlow, 65, 69, 77, 79
- Harrell, 92
- Harris, 65, 66, 67
- Hausman, 63, 71
- Head perceptions, 72
- Health, optimum, 17
- Hellersberg, 48, 57
- Hens, 71, 76, 77
- Heron, 81
- Historical material, 18
- Hoarding, 73, 74, 75, 76
- Hollinger, 85
- Home conditions, 27
- Home economics, 23, 56, 58
- Homeostasis, 62
- Home status, 62
- Household equipment, 13, 23, 44
- Housewife's schedule, 34
- Housing, 13
- Hueneman, 55
- Human behavior, 23, 25
- Human being as unit, 25, 26
- Human nature, 18
- Hunger, 42, 46, 70, 71, 73, 75, 77, 79, 80, 81, 82, 85, 90, 91
- "Hunger and Work in Savage Tribe," 48
- Hunt, 74, 75
- Ideology, 17, 40, 41
- Illinois, Southeast, 48, 57
- Illness, 48
- Imitation, 86
- Immigrants, 37, 58
- Income of group, 25
- Index, for weight, 81
- Individuals, 25, 57, 59, 77
 - identification of, 26
- Infant experience, 42, 44, 45, 75, 83
- Infant feeding, 16, 38, 43, 63

- Insects, 68
- Institutional practices, 18, 23, 50
- Insulin, 16, 75
- Intelligence and diet, 92, 93
- Interviews, 49, 56, 57, 58, 89
- Iowa City, 48
- Iowa, University of, 57
- Ivy, 62
- Jackson, 80
- Jews, 39
- Jobs, 37
- Joffe, Natalie, 58
- Jukes, 65, 68
- Karn, 91
- Kerrett, Rose, 5
- Keys, 93
- Kindergarten, 86
- King, 91
- Kinesthetic cue, 84
- Kleiber, 74
- Labor, division of, 37
- Laird, 83
- Learning, 56, 67, 75, 80, 90, 91, 92
- Leftovers, 36, 37
- Lent, 39
- Levine, 82
- Lewin, Kurt, 48, 57, 68, 85, 89
- Liddell, 79
- Lund, 87
- McCarrison, 91
- McCollum, 62, 63, 65
- McCord, 73, 76
- McGraw, 83
- Magical use of diet, 44
- Margolin, 80
- Marinho, 86
- Maslow, 67, 71
- Masserman, 75, 80
- Material used, 44
- Maurer, 92
- Maze learning, 91, 92
- Meals, idea of, 35, 82
- Medical practices, 13, 23, 38, 42
 - convalescents, 67
- Mental hygiene, 23
- Mental performance, 92
- Menu, 24, 36, 87
- Methods, 13, 18, 23, 34, 48, 52, 55, 58, 61, 72, 79, 81, 83, 84, 89
 - check lists, 34, 35, 56, 57
- Métraux, Rhoda, 58
- Mice, 61, 65
- Mittelman, 79
- Moir, 83
- Monkeys, 70, 74, 77, 79
- Morality, 14, 15, 24, 27, 42
- Morgan, 73, 75
- Motivation, 17, 67, 80, 81, 85, 90, 91, 92
- Mowrer, 78
- Murphy, 82
- Nervous system, 82, 91, 92
- Neurosis, 75, 78, 80
- New England, 27, 35
- Nissen, 70, 77
- Nowlis, 77, 78
- Nursery school, 64, 85, 86
- Nurses, 58
- Nutrition
 - approach, 15
 - Chart, 15
 - committee, 56
 - education, 15, 89
 - evaluation, 31, 32, 33, 35, 47, 89
 - knowledge, 36
 - principles, 16, 17, 41, 55
 - science of, 16, 25
 - surveys, 35, 36
 - value, 33, 88
- Nutritional behavior, 24, 56
- Nutritionist, 14, 58
- Obese child, 27
- Observational studies, 27, 28, 46, 55, 58
- Oestrous cycles, 62
- Old age. *See* Aged
- Olfactory sensitivity, 69, 70, 75, 83, 84
- Orient, 31, 88
- "Outline of System of Food Habits in Rural Southwest," 57
- Palatability, 65, 70, 72, 83
- Parasites, 78
- Passin, 48, 57
- Patterns, 13, 15, 18, 23, 27, 34, 36, 38, 39, 40, 47, 57, 67
 - ethnic, 34
 - general, 31
 - meals and services, 24, 35, 36, 37
 - regional, 57
- Patterson, 79
- Patton, 91
- Pavlov frame, 80
- Pellets, 72-76, 78
- Peptic ulcers, 45
- Physiological psychology, 63
- Physiology, 14-18, 41, 48, 67, 68, 75, 91
 - basic, 63
 - hunger, 63
 - needs, 61, 73
- Pigeon, 92
- Pigs, 36, 61, 75
- Platt, 83
- Poultry, 61
- Powdermaker, 56
- Preferences, 66, 68, 69-72, 77-79, 83-86, 90

- Pregnancy, 16, 38, 39, 41
- Preparation of food, 32, 33, 34, 56
- Preservation of food, 32, 37
- Price, 65
- Price of food, 39
- Problems, 27, 32, 41, 67, 68
- "Problems of Changing Habits," 5, 58
- Processing, 13, 28, 32, 35, 44
- Production, 13, 16, 23, 28, 31, 36, 37
- Protein, 31, 61, 62, 65, 70, 72
- Psychiatry, 23, 57
- Psychoanalysis, 57, 75
- Psychodynamics, 43
- Psychology, 14, 17, 18, 19, 23, 26, 27, 57, 67
- Psychomotor, 92
- Psychophysical, 83
- Psychosomatic disorders, 44, 45, 48, 79
- Punishment, 68, 78
- Purchasing of food, 33, 34, 38
- Purchasing power, 16, 17
- Queens College, 56
- Questionnaires, 23, 28, 34, 48, 52, 55, 56, 57
- Questions, to ask, 24-26, 31, 33, 42, 46, 47, 49, 52, 61, 67, 71, 72, 77, 80, 81, 82, 90
- Rabbits, 68, 70
- Rachitic, 65, 66, 68
- Rate of eating, 74, 81
- Rationing, 39
- Rats, 61-78, 80, 81, 90, 92
- Ready, 87
- Reality process, 82
- Regional variations, 41
- Reproduction, 62
- Research, 17, 18, 23, 24, 25
- Responses, 82
- Restaurants, 50
- Rewards, 67, 68, 78
- Rhythm in eating, 56, 81, 82
- Ribble, 75
- Rice, 89
- Richter, 62, 64, 65, 66
- Rickets, 64-66, 68, 91
- Roberts, 85
- Role of food, 39, 43
- Rural, 24, 25, 35, 37, 57
- Sanctions, 40, 43, 44
- Sanford, 82
- Scantlebury, 79
- Scarcity of, 36, 39, 57
- Schizophrenia, 92
- School lunches, 24, 50, 55
- Science of, 13, 24
- Selection, 17, 28, 61-65, 67-69
- Selenium, 65
- Sheep, 78, 79
- Shopping, 24, 33, 34, 37
- Shortages, 16, 23
- Skinner, 81
- Sladden, 68
- Smith, 74
- Social agency, 58
- Social conditions, 76, 77, 79, 86
- Social history, 18, 48
- Social pressure, 15, 33, 64
- "Social Process and Dietary Change," 57
- Social science, 24
- Social status, 37, 38, 41, 46
- Sociology, 14, 18, 23, 48
- Southeast America, 41, 47, 57
- Soya, 88
- Speech images, 42
- Stability, 16, 25, 46, 47
- Stature, increase of, 17
- Stellar, 74, 75
- Stevens, 91
- Stomach, 78-81
- Stone, 69
- Storage of food, 28, 31, 32, 58, 85, 89, 90
- Students, college, 48, 58, 85, 89, 90
 - historical data, 18
 - methods, 55, 56
 - objectives, 19, 23, 24, 26, 27, 31, 36, 48, 49
- Studies, 18, 19, 27, 35, 36, 42, 47, 48, 49, 56, 57, 65, 69, 71, 82, 83, 86
- Sub-cultural groups, 58
 - Czechs, 34, 49
 - Eskimo, 31
 - Italian, 26, 27, 42
 - Negro, 49, 57
- Substitutes, 46
- Surveys, 23, 35, 36, 49
- Sweetman, 83
- Symbolism, 42
- Syrians, 58
- Table manners, 40
- Taboos, 38, 39, 40
- Taste, 32, 63, 65, 83, 84, 86, 88
- Taylor, 81
- Techniques, 36, 55, 62, 70, 72, 74, 82, 83, 84, 89, 91
- Technology, 18, 24, 25, 26, 43
- Tests, 52, 57, 69, 70, 72, 73, 74, 82-86
 - mental, 92
 - projective, 63
- Therapeutic measures, 13
- Tools, 43
- Traditional, 14, 27, 42, 47, 55
- Transportation, 13
- Turner, 55
- Unit of study, 25

- United States, 15, 32, 39, 40, 46
- Urban, 23, 32, 34, 35, 37, 38, 39, 49
- Utensils, 43, 44, 56
- Vegetarian, 44, 45
- Viosterol, 66, 67
- Visual, 83
- Vitamins, 15, 16, 26, 32, 45, 48, 66, 91, 92
 - Vitamin A, 65, 67, 91
 - Vitamin B, 66, 68, 90, 91
 - Vitamin B complex, 66, 68, 90-92
 - Vitamin C, 48
 - Vitamin D, 66, 67
 - Vitamin E, 92
 - Vitamin G, 65
 - Vitamin precursor, 56
- Warden, 80
- Warkentin, 63
- Warner, 80
- Water, 90
- Weather, 87, 88, 89
- Wilder, 65
- Willerman, 89
- Wittenborn, 66, 68
- Wolfe, 73, 75, 79
- Workers, 41
- Young, 66-74, 81, 89
- Yudin, 77, 79



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